The FOUNDRY

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Castings Actively Engaged in Transportation Business

EASE with which huge crowds are handled, such as attended the recent pugilistic encounter in Philadelphia and the world's series games in New York and St. Louis, and the heavy movement of freight which has been breaking all records for a number of weeks, indicate the development that has taken place in the railroads of the country in recent years. Following the

Castings Have Made Possible the 20-Hour 1000-Mile Trip From New York To Chicago

period of rapid expansion, which immediately preceded the birth of the twentieth century, railroad engineers turned their attention to the rolling stock and have succeeded in perfecting a modern system of transportation which gives speed with the greatest comfort and safety. Foundrymen of the country have been leaders in this march of progress, for castings, including gray iron, steel, malleable and nonferrous, form the basis of construction from the wheels to the bell on the locomotive, from the shining number on the front of the large engine to the observation platform of the luxurious transcontinental limited. A general idea of the equipment required is shown by the fact that to haul approximately 951,000,000 passengers and 2,331,000,000 tons of freight yearly, in the neighborhood of 70,000 locomotives, 2,380,000 freight cars and 57,000 passenger coaches are necessary.

Find Where Castings Can Be Sold

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Convention Gives Entire

Technical Sessions Contribute Val —World's Record Display of Equip Scheduled for

NEXT spring will mark the thirty-first annual convention of the American Foundrymen's association, but on this occasion the exhibition feature will be omitted. The thirty-second annual convention will be held in the spring of 1928 with an exhibition. This radical change in the time of annual meeting was decided at a meeting of the board of directors on Sunday night, Sept. 26, and was announced at the annual meeting held Thursday, Sept. 30.

Several important reasons led to this decision of the board. The great congestion which has been experienced in recent years due to the number of conventions which are held throughout the country in the late summer and fall was the primary consideration. The stupendous character of the American Foundrymen's association exhibitions has made it impossible to find suitable facilities except in a few cities. It has been necessary to resort to state fair grounds as was the case in Rochester, Syracuse and Detroit, to find sufficient exhibition space. In many instances these fair grounds are needed for the state fairs and it is impossible to secure them until the advance of the winter season makes them almost untenable due to lack of adequate heating facilities. Furthermore, the prevalence of other conventions in which foundrymen are interested in the fall season makes the spring dates more attractive.

Transcending all previous gatherings, the thirtieth annual convention of the American Foundrymen's association with which was held the largest exhibition of foundry equipment and supplies ever assembled, the Detroit meeting long will be remembered by the 6,000 foundrymen who were present. From the opening meeting held Monday afternoon, Sept. 27, until the last technical session was adjourned, shortly after noon Friday, every gathering was filled with interest. The meetings of the various groups of the American Foundrymen's association, the foreign language sessions of the Second International Foundrymen's Congress and the joint deliberations with the institute of metals division of the American Institute of Mining and Metallurgical Engineers were marked by the largest attendance ever recorded for similar convocations.

The exhibition holds the record for all time. A total of nearly 85,000 square feet of floor space in three large buildings of the Michigan State fair grounds was required to house the displays of foundry machinery, equipment and supplies. Neither time nor expense had been spared to make

STUART WELLS UTLEY, whose election as president of the American Foundrymen's association, was announced at the Detroit convention, was born at Pontiac, Mich., June 25, 1879, the eldest son of the Rev. Wells H. and Emma Adams Utley. After spending part of his boyhood years on a western farm, he returned to Detroit in 1892, and has been a resident of that city since. His early education was received in the public schools and high schools of Detroit, and he graduated from the University of Michigan, with an A. B. degree in 1902. Shortly after graduation he entered the employ of the American Radiator Co., in its Detroit plants and three years later became connected with the Detroit Steel Castings Co. as cost clerk. Later he became successively purchasing agent, assistant secretary, secretary, and finally vice president and general manager, which position he still holds. Mr. Utley is a member of the American Iron and Steel institute and the Detroit Engineering society. For two years he was president of the Employers association of Detroit, and he is a director in the Michigan Manufacturers' association.

e Industry Marked Impetus

Val uip for able Information for Foundrymen ment Shown — Next Convention Spring of 1927

SAMUEL T. Johnston, elected vice president for the 1926-27 *term has been connected prominently with the various activities of the association since its formation.*

A native of Scotland Mr. Johnston came to Detroit in 1889 *and made application for a position with the Detroit Car Wheel Co., of which J. H. Whiting, now chairman of the Whiting Corp., Harvey, Ill., at that time was foundry superintendent.*

Shortly afterward Mr. Whiting organized the Detroit Foundry Equipment Co., and gave Mr. Johnston a position as salesman which he held for 10 *years. He left this position to accept one with the S. Obermayer Co., Chicago and has remained with this organization ever since. At present and for some time past he has been vice president and general manager of the company. In* 1908 *he served as vice president of the American Foundrymen's association. He has served on many committees and for many years was a director of the association. Mr. Johnston has been connected closely with the development of the Foundry Equipment Manufacturers' association and now is president of the organization.*

each exhibit a complete and attractive offering.

A total of more than 150 foreign foundrymen added an international coloring to the convention and exhibition which makes it unique in the annals of the American Foundrymen's association. These men represented twelve foreign countries and were in most cases large manufacturers, metallurgists or plant managers. The American Foundrymen's association convention was the primary object of their journey to this country, but a party of 75 or more has been making an extensive tour embracing Philadelphia, Buffalo, Detroit, Chicago, Cleveland, Pittsburgh and Washington. At the annual banquet held Thursday night, Sept. 30, the speakers' table was honored by the presence of the heads of these various delegations. Furthermore, the presentation of American Foundrymen's association medals to John Shaw, E. V. Ronceray, and to Thomas Turner, all famous European men notable in the foundry industry, gave an international touch to this colorful gathering.

Warmest commendation was extended to the Detroit foundrymen, and especially the committee which had charge of entertaining visitors to the convention. No trouble or expense was spared to demonstrate the thorough and practical hospitality of the city of Detroit. The band concert and entertainment at the Masonic Temple followed by a dance Wednesday night was one of the most enjoyable affairs ever attended by visitors at the annual American Foundrymen's association conventions.

Members of the American Foundrymen's association and visitors gathered under the flags of many nations at the east end of the Coliseum at 1:30 p. m., Monday, to inaugurate the annual convention of the association and to welcome delegates from European associations to the Second International Foundrymen's congress.

A. B. Root Jr., president of the association, officially welcomed the delegates and recalled the exceptionally cordial reception of American foundrymen when they visited various European countries and attended the International congress in Paris three years ago. He then presented Robert Crawford, president, Detroit Foundrymen's association, who extended the city's hospitality and voiced the hope that the stay of visitors in the convention city would be happy.

Harvey J. Campbell, vice president, Detroit board of commerce, as the representative of the governor of Michigan, welcomed delegates and visitors to Detroit. President Root introduced the

Distinguished European and American Foundrymen at the Detroit Convention

BACK ROW—(left to right)—Dr. Richard Moldenke, Watchung, N. J.; Robert Crawford, president, Detroit Foundrymen's association; Thomas H. Pangborn, vice president, Foundry Equipment Manufacturers association; Frank Russell, vice president, Refractories Association of Great Britain; William Jolley, member of council, British Cast Iron Research association; L. L. Anthes, director, A. F. A.; A. B. Root Jr., president A. F. A.; V. E. Minich, chairman, New York Reception committee, A. F. A.; Alfred E. Howell, past president, A. F. A.; John A. Penton, honorary member, A. F. A.; S. T. Johnston, president, Foundry Equipment Manufacturers association; H. Cole Estep, chairman, Committee on International Relations, A. F. A.; S. W. Utley, president elect, A. F. A.; Harvey Campbell, vice president, Detroit Board of Commerce; C. E. Hoyt, executive secretary, A. F. A.; G. H. Clamer, director, A. F. A.

FRONT ROW, seated (left to right)—Sixten Nilsson, Swedish Foundrymen's association; T. J. Brons, Co-operative Society of Dutch Iron and Steel Founders; E. V. Ronceray, vice president, Association Technique de Fonderie de France; Dr. ing. Geilenkirchen, managing director Verein Deutscher Eisengiesserein; John Cameron, past president, Institute of British Foundrymen; Carlo Vanzetti, president, Italian Foundrymen's association; S. H. Russell, vice president, Institute of British Foundrymen; Paul Ropsy, president, Association Technique de Fonderie de Belgique; John Shaw, John A. Penton medalist, 1926; Morden Grindal, Norwegian Foundrymen's association.

following official representatives of the associations of other countries:

Paul Ropsy, president of the Association Technique de Fonderie de Belgique; E. V. Ronceray, vice president, Association Technique de Fonderie de France; John Cameron, past president, Institute of British Foundrymen; Ing. Carlo Vanzetti, president, Italian Foundrymen's association; Morden Grindal, representative of the Norwegian Foundrymen's association; T. J. Brons, representative of the Co-operative Society of Dutch Iron & Steel Founders; Don Jose Iturrioz, representing the Spanish Foundrymen's association; Sixten Nilsson, representing the Swedish Foundrymen's association.

Growth of the association during the 30 years of existence and the work of the various departments during the past year were traced by President Root in his address at the business meeting on Thursday afternoon. Mr. Root told briefly of the work of the committees and joint committees in solving some of the problems of the industry, and also noted the large increase in the number of exchange papers with European associations this year.

In making the report of the secretary, Mr. Hoyt stated that on Jan. 1 the total membership of the association was 1754, and that between that time and the opening of the convention 450 new members had been secured and 50 lost, making a total membership on Sept. 27 of 2154. On Thursday noon the registration was 5100, considerably in excess of the previous high mark of 4420 in Milwaukee in 1924. This figure does not include the ladies registration of 469. Approximately 135 visitors from overseas were registered. Mr. Hoyt also gave some statistics on the exhibition of foundry equipment, which, he stated, was the largest in both floor space used and number of exhibits in the history of the association.

The report of the nominating committee was read and since no other nominations were received, the following were declared elected and will take office at the meeting of the board of directors which must be held within 90 days after the close of the convention: President, S. Wells Utley, general manager of the Detroit Steel Casting Co., Detroit; vice president, Samuel T. Johnston, vice president, S. Obermayer Co., Chicago; directors, Martin W. Henley, vice president, Frazer & Jones Co., Syracuse, N. Y.; N. K. B. Patch, secretary, Lumen Bearing Co., Buffalo; A. B. Root Jr., mechanical engineer, Hunt-Spiller Mfg. Co., Boston; S. C. Vessy, president, W. W. Sly Mfg. Co., Cleveland; and L. C. Wilson, vice president, Federal Malleable Co., Milwaukee.

Alfred B. Howell, Somerville Stove Works, Somerville, N. J., chairman of the committee on resolutions, presented resolutions thanking the Detroit committee for its hospitality and thanking the officers of the association for the work accomplished during the year. Another resolution placed the association on record as favoring the continuation of the International Foundrymen's congress and the ex-

change of ideas among the leading foundry nations of the world. Resolutions of condolence on the death of George K. Elliott, chief metallurgist of the Lunkenheimer Co., Cincinnati, and of the father of J. L. Mahon, American Car & Foundry Co., Detroit, and chairman of the ladies entertainment committee, were adopted.

Dean C. B. Connelley, Carnegie Institute of Technology, Pittsburgh, reported on the Obermayer prize award. Four entries were received and the prize was awarded to Redfield H. Allen, East Cambridge, Mass. B. D. Fuller, Whitehead Bros. Co., Cleveland, reported on the molding contest conducted by the committee on apprenticeship training. The awards in this contest are reported elsewhere in this issue of THE FOUNDRY. It was announced that Walter M. Saunders, Saunders & Franklin, Providence, had resigned as chairman of the joint committee on molding sand research and that B. D. Fuller had been appointed chairman.

Dan M. Avey, editor, THE FOUNDRY, Cleveland, chairman of the joint committee on pattern standardization, reported on the activities of that committee. He also read a number of proposed recommended practices governing certain phases of patternmaking, which were recommended to the board of directors by the meeting. President Root placed a resolution before the meeting favoring the placing of the weights of castings on blueprints. This resolution was adopted.

Secretary Hoyt then explained the action of the board of directors at the meeting Sunday evening, Sept. 26, following the annual alumni dinner, in changing the time of the annual meeting of the association. The next annual meeting of the association will be held in the spring of 1927 without an exhibit, while the thirty-second annual convention will be held in the spring of 1928 with an exhibition.

European Delegates to Foundry Convention

Belgium

Paul Ropsy, president, Association Technique de Fonderie de Belgique; managing director of Belgian Griffin Co., Merxem-les-Anvers.
Leon Gerad, manager, Fonderies Nestor Martin, Brussels.
G. Fossepraz, managing director Nouvelle Societe des Acieries de Mons, Nimy-les-Mons.
P. C. Fassotte, Pittevil & Co., Brussels.

France

E. V. Ronceray, vice president, Association Technique de Fonderie de France; managing director Etablishements Bonvillain et Ronceray, Choisy-le-Roi, near Paris.
H. Magdalenat, vice president, Association Technique de Fonderie de France and managing director of S. A. des Usines de Rosieres, Bourges, Cher.
Leon Pierre Montupet, Fonderies Montupet, Paris.
Mr. Montupet, son of Leon Pierre Montupet.
Claude Primet, of Fonderies Montupet, Paris.
Mr. Primet, son of Claude Primet.
Paul Thome, managing director of S. A. des Fonderies Thome Fills & Cromback, Nouzonville, Ardennes.
Mr. Cantenot, manager of the Malleable Iron Foundry, Acieries de Firminy, Firminy, Loire.
H. Saint-Clivier, manager of the Acieries de Firminy, Firminy, Loire.

Germany

Dr. Ing. Geilenkirchen, managing director Verein Deutscher Eisengiesserei, Dusseldorf.
Dipl. ing. Gruson of Otto Gruson & Co., Magdeburg-Buckau. Mrs. Gruson.
Mrs. Farenholtz, Magdelburg-Buckau.
Dipl. ing. H. L. Korschann, of Duisburg.
Dr. Heinr. Biagosch, partner of Karl Krause, Leipsig.
Fritz Buch, of Carl Buch B.m.b. H., Weidenau.
Direktor J. H. Fahr, of Maschinenfabrik Fahr, Stockach-Baden.
Dipl. ing. Flender, of A. Friedr. Flender & Co., Bocholt.
Dir. Dr. Greiner, of Maschinenfabrik Esalingen, Esslingen-Neckar.
Fabrikant Gross, Jr., of Bugeleisenfabrik A. G., Schab. Hall.
Direktor Hellmund, of Eisen-und Stahlwerk Werner, Dulken.
Direktor Karl Jaeger, of Reutherwerk, Mannheim-Wladhof.
Heinz Kremener, of Alexander Kremener, Hartung A. G., Berlin.
Fr. Kuppersbusch, of Kuppersbusch & Sohne, Gelsenkirchen. Mrs. Fr. Kuppersbusch.
Dir. Wilh. Linmann, of Eisener Eisenwerke, Essen-Altenessen.
Dir. Nagel, manager of Badische Maschinenfabrik & Eisengiesserei, Durlach-Baden.
Prof. Dr. Piwowarski, Technische Hochshule, Aachen.
G. A. Schmole Jr., of Schmole & Co., Menden.
Dir. Alfred Simon, of M. Streicher, Stuttgart-Cannstatt.
Erwin Simon, of M. Streicher, Stuttgart-Cannstatt.
Max Jul. Unger, of Unger & Co., Werdau.
Heinr. Werther, of Magdeburg & Werther, Halle-Salle.
Mr. Monforts, of Eisengiesserei Monforts, Munchen-Gladbachs. Mrs. Monforts. Miss Monforts.
Max Becker, Eisengiesserei Rodinghausen, Menden.
Kommerzienrat Demmer, Gebr. Demmer, Eisenach.
Generaldirektor Hugo Eicken, W. Krefft A. G., Gevelsberg.
Direktor Ernst Hummel, Gebr. Reuling, Mannheim-Neckarau.
Direktor Philipp Roeder, Gebr. Roeder A. G., Darmstadt.
Hans Roeder, Gebr. Roeder A. G., Darmstadt.
Kommerzienrat Billand, Armaturenwerk A. G., Kaiserslautern.
Obering. Weichel, Armaturenwerk A. G., Kaiserslautern.
Ing. C. Irresberger, Saluzburg, Reichenhallerstrasse 7a.
Ber. Ing. Joh. Mehrtens, Berlin.
Direktor Kazmeyer, Swabische Huttenwerke, Konigsbronn.
Gen. Kom Rat Dr. ing. von Opel, Russelheim-am-Main.
Ing. L. Zerzog, director, Verein Deutscher Giessererfachleute.
Dr. Prippenow and son.
Herr Joly.

Great Britain

S. H. Russell, vice president, Institute of British Foundrymen; partner of S. Russell & Sons, Bath Lane Foundry, Leicester.
John Cameron, past president (1925-26) of the Institute of British Foundrymen; Cameron & Roberton, Ltd., South Bank Ironworks, Kirkintilloch, near Glasgow, Scotland. Mrs. John Cameron.
H. D. Campbell of Shaw Glasgow, Ltd., Maryhill Iron Works, Glasgow. Mrs. H. D. Campbell.
Thomas H. Gray, of Thos. E. Gray & Co., Ltd., London.
William Jolley, member of Institute of British Foundrymen and member of council of the British Cast Iron Research association; Metropolitan-Vickers Electric Co., Ltd., Manchester.
W. B. Lake, Lake & Elliot, Ltd., Braintree, Essex.
E. Longden, of J. H. Hetherington & Son, Ltd., Manchester (South). Mrs. E. Longden.
James M. Primrose, of Grangemouth Iron Co., Grange Ironworks, Falkirk, Scotland.
Frank Russell, managing director, General Refractories Co., Ltd., Auldam House, Worksop, Notts. Representing the Refractories association. Mrs. Frank Russell.
Arthur Ryner, managing director, International Processes Ltd., Victoria, London S. W. 1.
J. A. E. Wells, of Edgar Allen & Co., Ltd., Sheffield. Mrs. J. A. E. Wells.
Harry Winterton, of Wm. Cummings & Co., Ltd., Moorlands, Milngavie, North Britain. Representing the Refractories association. Mrs. Harry Winterton.
John Shaw, Brightside Foundry & Engineering Co., Ltd., Sheffield.
Thomas Firth Jr., Brightside Foundry & Engineering Co., Ltd., Sheffield.
J. H. Booth, director and works manager of Barker Perkins, Ltd., Westwood Works, Peterborough.
F. Blackwell, Diamond Foundry Co., Ltd., Luton.
C. G. Ramsey, Metropolitan Vickers Electrical Co., Ltd., Manchester.

Italy

Ing. Carlo Vanzetti, president, Italian Foundrymen's association; managing director Fonderia Milanese di Acciaio, Milano
Guido Vanzetti, of the Polytechnic School of Milano, son of Carlo Vanzetti.
Comm. Antonio Galtarossa, director of Soc. Fratelli Galtarossa and president Industrial Federation of Verona.
Carlo Garrone, managing director of Fonderia Garrone, Torino.
Luigi and Francesco Garrone, sons of Carlo Garrone.
Luigi Carlo Gualco, foundry proprietor, Torino.
Ing. Gino Modigliani, managing director Sociata Olivetti, Ivrea.
Ing. Gr. Uff. Amedeo Pelliciotti, president S. A. Fabbrica Molle ed Accessori per Rotabili "FRAM," Torino.
Ing. Franco Ratti, of Soc. Franchi & Gregorini di Brescia, Milano.
Ing. Agostino Rocca, of Dalmine Steelworks.
Ing. Emilio De Benedetti, of the executive commission of the General Industrial Confederation of Italy, Torino. Mrs. De Benedetti.
Ing. Comm. Ugo Fano, managing director Fonderia Nebiolo, Torino. Guido Fana, son of Ugo Fano.

Luxemburg

Raymond Henry, chief engineer, Fonderies et Laminoirs Soc. An. Ougree-Marihaye, Rodange.
H. Coqueugnot, managing director of Societe Metallurgique Aubrives-Villerupt, Luxemburg.

Netherlands

T. J. Brons, official representative of the Co-operative Society of Dutch Iron and Steel Founders. N. V. Appingedammer Bronsmotorenfabriek, Appingedam. Miss Brons, T. J. Brons's sister.
W. H. Boom, managing director N. V. G. Dikkers & Co., Hengelo (O).
W. H. Nieuwenhuijs, foundry manager Machienfabriek Gebrs. Stork & Co., Hengelo (O).
Mr. Stork, managing director, Machinenfabriek Gbrs. Stork & Co., Hengelo (O).

Spain

Don Jose Iturrioz, of Ajuria y Aranzabal, Vitoria.

Sweden

C. C. Braun, Stockholm.
Sixten Nilsson, Sveriges Maskinindustriforening, Stockholm.

Switzerland

Mr. Aebi of Societe Aebi & Co., Berthoud.
Mr. Bucher Guyer, Neider Weningen, Zurich.
Paul Hegi, Fonderie Hegi & Co., Oberbourg, pres. Berthoud.

The committee on conventions and exhibits will select the location of the 1927 and 1928 meetings and will report at the annual meeting of the board of directors which must be held within 90 days after the close of the convention.

Upon the motion of R. A. Bull, Steel Founders Research group, Chicago, Retiring President A. B. Root Jr. was elected to honorary membership in the association.

Dr. ing Geilenkirchen, managing director Verein Deutscher Eisengiessereien, on behalf of the foreign foundrymen visiting the convention, thanked the association for the hospitality and splendid entertainment accorded. He also stated that the German Foundrymen's association is planning the Third International Congress in Dusseldorf in 1929, and extended an invitation to the American Foundrymen's association to be represented at that meeting. President Root expressed the gratitude of the American Foundrymen's association that so many European representatives were present at Detroit. He stated that the invitation of the German association to the congress in 1929 would be referred to the committee on international relations for action.

One of the high lights of the activities of the week and the last event on the social program was the annual banquet Thursday evening in the ballroom of the Hotel Statler, which was attended by a large delegation of foreign visitors as well as many members of the association.

A. B. Root Jr., in the capacity of toastmaster, introduced Mayor John W. Smith of Detroit, who welcomed the convention visitors to the city. Mr. Root then spoke of the remarkable advances that have taken place in the foundry industry since the association was organized 30 years ago. He touched on the work of the equipment and supply manufacturers in making possible rapid progress. Mr. Root also thanked the European foundrymen for their presence in Detroit and expressed the hope that the exchange of ideas between foundrymen in the United States and across the sea would be even greater in the future. He also thanked the Detroit entertainment committees for their splendid work in making the stay in Detroit exceptionally pleasant.

H. Cole Estep, Penton Publishing Co., Cleveland, chairman of the committee on international relations, introduced the distinguished guests from abroad who represented various European foundrymen's associations. John Cameron, past president of the Institute of British Foundrymen, and managing director of Cameron & Roberton, Ltd., Kirkintilloch, near Glasgow, responded for the overseas delegates. President Root then introduced president-elect S. Wells Utley of the American Foundrymen's association.

Past President Olson of the association and chairman of the board of awards then presented the three gold medals. The Joseph S. Seaman medal was presented to Prof. Thomas Turner, Birmingham university, Birmingham, England; the John A. Penton medal was awarded to John Shaw, Brightside Foundry & Engineering Co., Ltd., Sheffield, England; and the J. H. Whiting medal to E. V. Ronceray, president and managing director Establissements Bonvillain et Ronceray, Choisly-le-Roi, near Paris, France Prof. Turner was unable to be present, due to the fact that he retired from 25 years of university work that night, and the medal was accepted by his son. Responses were made by Mr. Turner, Mr, Shaw and Mr. Ronceray.

The principal address of the evening was delivered by Charles F. Kettering, noted American inventor and scientist, president of the Dayton Engineering Laboratories Co., vice president the Dayton-Wright Airplane Co., and an officer in a number of industrial and financial institutions of Dayton, O. Mr. Kettering discussed the trend of scientific research in the future with particular reference to its metallurgical aspect.

Consider Gray Iron Practice

GRAY iron foundrymen, to the number of nearly 400, evinced the keenest interest in the four papers presented at the meeting Tuesday afternoon under the chairmanship of J. W. Bolton, Frank Foundries Corp., Moline, Ill. Multiplicity of views evoked during the lengthy discussion which followed the reading of each paper indicated the wide field which still remains to be cultivated before cupola operation becomes standardized or before the well known idiosyncrasies of this melting medium become ironed out.

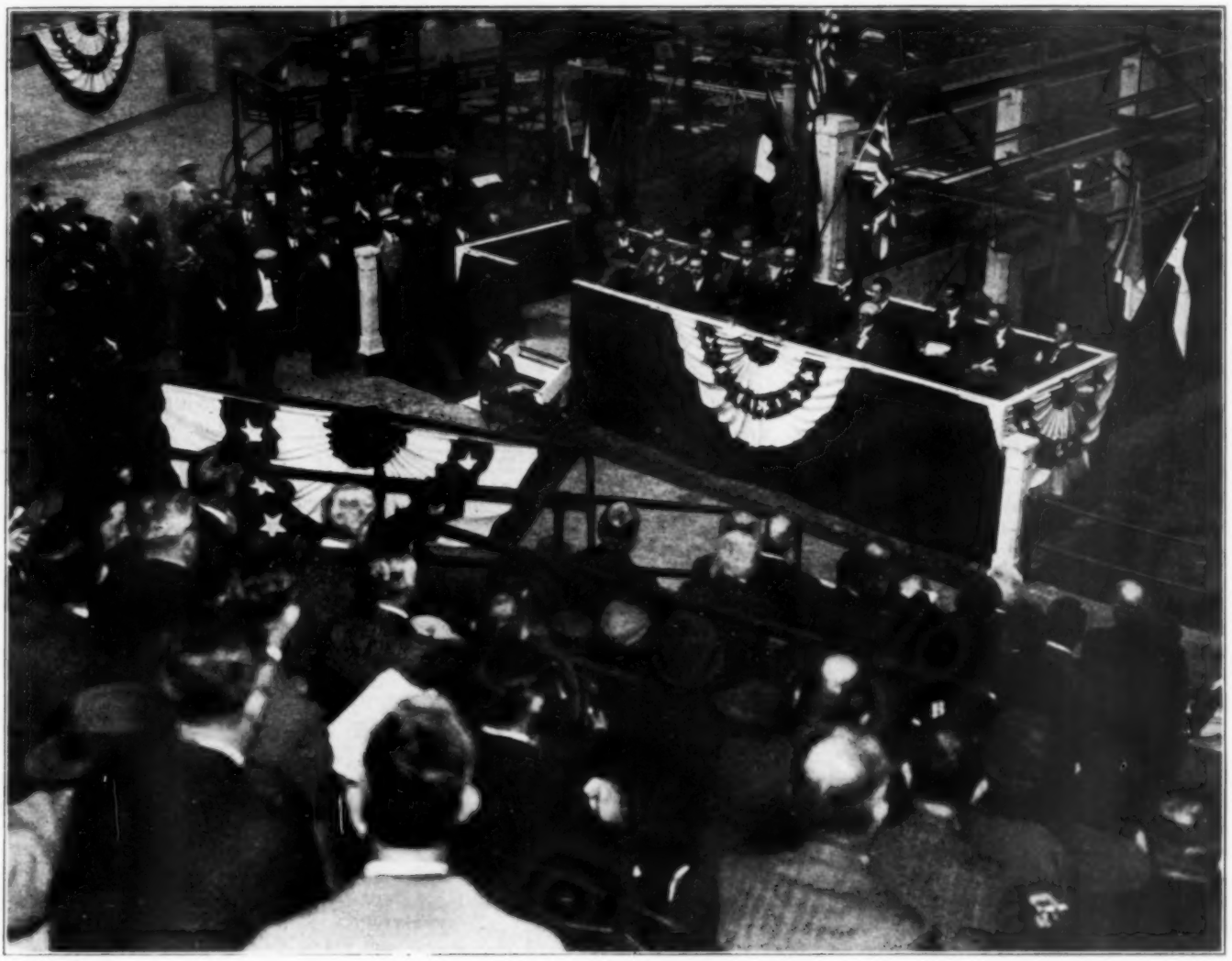
Interesting detail of a European experience in melting all steel charges supplemented by proper additions of ferrosilicon and ferromanganese for the production of high grade gray iron castings was presented by Frank Hudson, assistant superintendent Wyoming Shovel Works, Wyoming, Pa., to confirm the views of T. F. Jennings, Utah Copper Co., Garfield, Utah, expressed in his paper "Melting All Steel Charges in the Cupola." E. Longdon, J. H. Hetherinton & Son, Manchester, England, ventured the assertion that if Jennings had substituted silica sand for limestone he would not have been troubled with foaming slag in his early trials.

David McLain, Milwaukee, pointed to the fact that the total carbon in the casting made in this manner approximated 2.30 per cent and clearly proved that steel melted in the cupola absorbs carbon. However, the total is considerably lower than in ordinary cast iron and accounts for the extra strength of the metal. This view also was supported by O. W. Potter, University of Minnesota, who stated that all steel charges melted in the cupola for bessemer conversion invariably show increase in the carbon content.

Interesting discussion on many related features was precipitated by the paper on cupola melting presented by R. E. Wendt and J. P. Walsted, Purdue university, Lafayette, Ind. The Belgian exchange paper "Chaplets in Heavy Iron Castings" was read in abstract by J. T. McKenzie, American Cast Iron Pipe Co., Birmingham, Ala., in the absence of the author, Ivan Lamoreux. H. W. Dietet, United States Radiator Corp., Detroit, presented a paper on a method of calculating gates for castings.

Two exchange papers presented at the gray iron testing session on Wednesday morning aroused considerable discussion among the metallurgists and many other foundrymen interested in the metallurgy of cast iron and closely related phases of the subject. The first paper, "Testing Cast Iron," by A. E. LeThomas, prepared at the instigation of the Association Technique de Fonderie de France, was presented by E. V. Ronceray. The Institute of British Foundrymen's paper, "Some Gray Iron Problems," prepared by John Shaw, foundry manager Brightside Engineering & Foundry Co., Sheffield, England, was read by the author.

Out of respect for the late G. K.



A Cosmopolitian Audience Attended the Opening of the Convention on Monday

Elliott who died a few days before the convention opened, his paper "A Shearing Test for Cast Iron," was read in full by J. W. Bolton, Frank Foundries Corp., Moline, Ill. On motion of E. J. Lowrey the paper was accepted without discussion. "Strength of Cast Iron in Its Relation to Thickness," was the subject of a paper prepared by W. H. Rother and V. M. Mazurie, Buffalo Foundry & Machine Co., Buffalo.

E. V. Ronceray explained that while French foundrymen attached considerable importance to the Fremont shearing test as representing the actual strength of the iron in a casting at any given point as opposed to gaging the strength of a casting by taking readings from a test bar cast separately, still they also employed other tests for comparison and as a means of gaining a comprehensive knowledge of the composition of the iron.

J. T. McKenzie, American Cast Iron Pipe Co., Birmingham, Ala., admitted that the shearing test had a legitimate place in the testing field, but claimed that by itself it was of comparatively little value. Invariably the shearing test showed a much lower strength in the iron than that shown by the tensile test. According to Mr. McKenzie all tests so far devised are only comparative and must be correlated intelligently and with full knowledge of every factor involved in the production of castings.

Among the five papers presented under the chairmanship of H. Cole Estep, Penton Publishing Co., Cleveland, at the session on cast iron Thursday, two were prepared by foreign foundrymen. One was the French exchange paper prepared by A. Portevin and P. Chevenard and was presented in abstract by E. V. Ronceray. The other was prepared by Dr. E. Piwowarsky, technical high school, Aachen, Germany on invitation of the Verein Deutscher Eisengiessereien. The first paper dealt with the dilatometric analysis of iron, a method it is claimed is practiced to a considerable extent abroad, but not yet introduced into the United States. The second paper described a new type of melting furnace which combines some of the features of a cupola, and open hearth and a reverbatory furnace in which the iron can be melted at a temperature of 2900 degrees Fahr.

A free translation of a German extract of the second paper prepared by the author was presented, with interesting digressions, by Dr. Moldenke, Watchung, N. J. The paper was based on the premise that when molten iron is heated to a temperature well above the ordinary melting range, all impurities are driven off and the other elements, particularly the carbon, are afforded an opportunity to rearrange themselves to produce a solid, homogeneous mass.

Oliver Smalley, New York, presented a paper on heat resistant cast iron in which he described methods and charges employed to produce an iron with a tensile strength of 70,000 pounds per square inch and with a transverse breaking strength of 6500 pounds. The paper was divided into three sections. The first dealt with iron poured into sand and iron molds. The second admitted that little progress had been noted in recent years

in the manufacture of chilled castings. The third part described experiments carried on by the author for the American Brakeshoe Co., in which the life of castings was increased 100 per cent by suitable heat treatment. In a summary the author stated that high silicon resists growth. Result of varying amounts of magnanese is doubtful. The proper phosphorus content depends on many factors and the presence of sulphur within reasonable limits, increases resistance to wear.

J. T. McKenzie read a paper on the effect of phosphorus in cast iron with particular reference to pipe castings. In the discussion which followed, E. V. Ronceray, Paris, France, stated that satisfactory pipes are made in France with a phosphorus content up to 1.50 per cent. Effect of various alloys on the growth of cast iron under repeated heatings and coolings was the subject of a paper by R. R. Kennedy and G. J. Oswald, National Cash Register Co., Dayton, O.

Stress Sand Test Importance

OVER 100 were present when Chairman Kihn called the session on cores and corebinders to order Monday afternoon. H. L. Campbell, University of Michigan, Ann Arbor, Mich., read a paper describing tests carried on to determine a standard sand for core testing and advocated the use of Michigan City sand from 60 to 70 mesh. In the discussion that followed, H. S. Austin, Campbell, Wyant and Cannon Foundry Co., Muskegon, Mich., inquired why Ottawa sand gave higher tests. This was accounted for by the fact that the Ottawa sand is cleaner. A. A. Grubb, Ohio Brass Co., Mansfield, O., stated that Michigan City sand absorbs more dye, due to containing clay and it is not as good as Ottawa sand for testing purposes. If Michigan City sand is used, specifications for cleanliness as gaged by the dye absorption test must be made. Others who entered into the discussion were, C. A. Hansen, General Electric Co., Schenectady, N. Y., John A. Bolton, Frank Foundries Corp., Moline, Ill., H. W. Dietert, United States Radiator Corp., Detroit and R. A. Bull, Electric Steel Founders research group, Chicago, and the concensus of opinion seemed to be in favor of using Ottawa sand rather than Michigan City sand for testing cores.

Dr. Ries, Cornell university, Ithaca, N. Y., gave a resume of the report of the joint committee on sand testing which was presented in full at the sand session on Friday. The committee recommended that dry sand cores be used, with the strength determined as tensile strength in pounds per square inch. The bars should be made in briquettes and the sand be tamped with a mallet.

C. A. Hansen, General Electric Co., Schenectady, N. Y., presented an interesting paper on tests made on the various oils used commercially in core making and also referred to the properties of some of the dry binders and said that cores made with dry binders must be used within a reasonable time as they had a tendency to absorb moisture and would sag. Mr. Hansen stated also that the addition of oil to dry binder would not prevent the absorption of moisture. The session was concluded with the reading of a paper on methods for determining the properties of cores made with cereal binders, H. L. Campbell. The method used was the cone penetration on green sand cores. Permeability tests were made with the American Foundrymen's association apparatus as was the determination of the dry bond stregnth.

Indicative of the almost limitless field which still remains to be cultivated, the reports submitted at the Thursday session simply reported progress and on motion were accepted and referred to the incoming board of directors. W. M. Saunders, Saunders & Franklin, Providence, R. I., chairman, presented the report of the American Foundrymen's committee on the joint committee on molding sand research. The report of the sub-committee on tests was read by Dr. H. Ries, Cornell university, Ithaca, N. Y. R. F. Harrington, Hunt-Spiller Mfg. Corp., Boston, presented the report of the committee on reclamation. A report on a number of experiments designed to show the fusing points of various sands and an analysis of the factors which affect the fusing point was read by Howells Frechette, Canadian department of mines, Ottawa, Ontario.

Following his report Mr. Saunders suggested appropriate steps should be taken to interest a prominent foundry or group of foundries in the establishment of a fellowship in some well equipped school for carrying on the work.

Some practical and technical data obtained from the use of clay additions to molding sand heaps gave R. F. Harrington an opportunity to describe in considerable detail the character of the work he and associates have been carrying on for several years. Some of the practical difficulties which confront foundrymen in the reclamation problem were aired in an animated discussion which followed the presentation of the paper. For example it was shown that peculiar conditions obtain in the plant where the work was prosecuted, therefore many of the figures submitted on various features would not apply under other conditions.

Other papers presented at this session included one on strength testing of foundry sands by T. C. Adams, Cornell university, Ithaca, N. Y., and one on the subject of sand control in the foundry by H. W. Dietert, United States Radiator Corp., Detroit.

Apropos of the comments of several practical foundrymen at a preceding session devoted to the subject of sand handling and control John Howe Hall,

Obermayer Award

THE 1926 Obermayer prize for the best foundry rig or device to aid in production was awarded to Redfield H. Allen, East Cambridge, Mass., for his apparatus to be used in raising the cupola bottom doors. The apparatus consists of a differential chain block or other suitable hoist, two extension bars which slide into lugs on the cupola bottom doors, and a two-part chain having rings at the ends to slip over the ends of the extension bars and a ring at the center for the hoist hook.

After placing the chain rings over the ends of the bars, the hoist is operated until both doors are closed. For the protection of the man who goes under the cupola to set the supporting post, a second man inserts an 8-foot bar in a stirrup and uses it as a pry or fulcrum under the lip door to guard against a possible drop of the doors in case the chain breaks or the hoist should fail for any reason. After the post is set, the hoist is slacked off, extension bars withdrawn and the chains looped back over a hook conveniently located.

Taylor-Wharton Iron & Steel Co., High Bridge, N. J., deprecated the tendency of authors to use unnecessarily ponderous language where simple words and shop terms are available. He claimed that while certain technical terms have been coined, terms that express the author's meaning clearly to other men who have had a similar scholastic training, still this number relatively is small. Even in this class the number who have soared so far that their mother tongue is forgotten is extremely limited. Plain language and simple terms are intelligible to all who attend the various sessions.

A. V. Leun, Cornell university, Ithaca, N. Y., presented an illustrated paper describing the effect of mulling time on some of the properties of sand. Commencing with a period of 10 minutes he showed the results in a graduated scale up to and including a period of 120 minutes. In the discussion which followed several speakers admitted the tests had a certain academic interest, but had no application commercially. C. A. Hansen, General Electric Co., Schenectady, N. Y., claimed that the moisture content of No. 0 Albany sand, 8 per cent, rendered the sand unfit for foundry use. R. F. Harrington, Hunt-Spiller Corp., Boston, stated that under modern production methods it was useless to consider leaving the sand in the muller for such a long period as 120 minutes. E. S. Carman, Osborn Mfg.Co., Cleveland, suggested that the adoption of a machine in which an ordinary long mulling time could be concentrated in a few minutes seemed to offer a solution to the problem.

L. B. Thomas, Fairbank-Morse Co., Three Rivers, Mich., presented a paper describing the methods adopted in his plant for the selection of sand and its subsequent control while in use. Grading Molding Sands, was the subject of a paper read by C. A. Hansen, General Electric Co., Schenectady, N. Y. Mr. Hansen explained that the paper primarily was prepared as a contribution to the deliberations of the subcommittee of tests of the joint committee on sand research.

Find Transportation a Problem

MATERIAL handling machinery manufacturers and a great many foundrymen agree that the transportation of materials in a foundry can be improved upon greatly. Two suggestions for carrying out such improvement were presented at the Monday afternoon session on this subject in a paper on "Handling Materials in a Foundry," by E. T. Bennington, manager, Cleveland Electric Tramrail division, Cleveland Crane & Engineering Co., Wickliffe, O. Mr. Bennington stated that all conveyor equipment should be installed, first, to eliminate handling operations and, second, to increase the size of the unit of production, such as the ladle, the flask and the size of the load carried to the cleaning room.

In the discussion which followed, E. S. Cohen, Stoney Foundry Engineering Equipment Co., Cleveland, questioned the application of overhead monorail conveyors to core setting and molding operations in the foundry. This view also was shared by H. L. McKinnon, secretary, C. O. Bartlett & Snow Co., Cleveland, who declared that overhead systems cost more than floor systems of conveyors for similar loads and equipment, and that the overhead system interferes with foundry lighting. Mr. McKinnon said that in all engineering estimates his company had made the ground systems had proved more economical in total cost. He described in detail a 2-ton skip hoist which has been used successfully for two years by one plant for charging a cupola of 80-inch shell or over, three different materials being charged by means of roller bearing cars and a specially designed truck with locking device.

J. R. White, vice president, Rickard & Co., Inc., New York, asked whether such a skip hoist could give even distribution of the charge. Mr. McKinnon replied that the positions of the beginning and finish of the dump vary four feet, giving a perfect layer in the cupola. Mr. McKinnon also stated that the charging operation does not damage the lining, but that a 5-foot ring of cast iron brick lining was installed around the cupola top to guard against variations in the force of the charge. W. D. Moore, American Cast Iron Pipe Co., Birmingham, recalled that although the operation mentioned by Mr. McKinnon charges three types of material, most foundries mix five to ten materials in the charge, hence the savings in manpower effected might not be so outstanding.

To a question of Dean C. B. Connelley, Carnegie Institute of Technology, Pittsburgh, Mr. Bennington, replied that the ladle handling conveyor described in his paper was electrically controlled only in the raising and lowering of the ladle, progressive travel being manually controlled. Others who discussed this paper were: Major L. L. Anthes, Anthes Foundry Co., Ltd., Toronto, Canada and E. Longden, J. H. Hetherrington & Sons, Ltd., Manchester, England.

The second paper of this session, "Saving in Foundry Handling with the Electric Industrial Truck," was presented by the author, H. J. Payne, electric industrial truck department, Society for Electrical Development, New York. Mr. Payne, by the use of photographic slides, showed many foundry installations of the electric truck and tractor and told how distinct savings in the material handling had been accomplished with their use.

In discussing this paper, E. S. Cohen stated that his company recently seriously had considered abandoning electric truck equipment in the foundry and substituting gasoline-operated trucks.

Survey Refractories

IN OPENING the meeting of the joint committee on foundry refractories, Wednesday afternoon, L. C. Hewitt, chairman, stated that the reason for a joint committee was to avoid duplication of efforts and to determine the best refractories for each purpose. C. N. Ring, Electric Steel Founders' Research group, Chicago, read the report of the committee on steel foundry refractories. The report showed that acid and basic materials undergo the same conditions except for chemical requirements. He also stated that the brick have to withstand a temperature of 1750 degrees Cent., and to obtain the best results from refractories, the furnace operators should be more careful and the furnace be designed properly. J. R. Allan, International Harvester Co., Chicago, spoke on the work accomplished by the committee on malleable refractories. Standard

sizes of taphole brick and bung brick were recommended. Returns from a questionnaire indicated considerable saving in refractories per ton of metal melted when powdered fuel was used.

Standardization and determination of the best types of refractories for nonferrous foundry purposes involves considerable work according to H. M. St. John, Detroit Lubricator Co., Detroit. Over 27 different kinds of furnaces of varying sizes are in use in the industry. Also there is a wide variation in operation and practice. The committee hopes eventually to have all practices and methods of operation standardized.

A questionnaire is being prepared to be sent to the gray iron foundries to assist the committee, according to James T. MacKenzie, of the American Cast Iron Pipe Co., Birmingham, Ala., chairman. This questionnaire will enable the committee to determine the requirements of the gray iron foundries for refractory materials and the conditions encountered.

Study Malleable Iron

SEVERAL questions of unusual significance to producers and users of malleable cast iron were discussed at the Wednesday morning malleable sessions, at which L. C. Wilson, Federal Malleable Co., West Allis, Wis., presided. The questions were introduced by H. A. Schwartz, National Malleable & Steel Castings Co., Cleveland, in a paper entitled, "What May Be Required of Malleable Cast Iron."

Mr. Schwartz declared that yield point determinations for malleable fluctuate widely and cited instances of variations. Enrique Touceda, Albany, N. Y., disagreed with this, stating that in his experience determinations by the divider and drop-of-beam methods both had proved satisfactory. W. R. Bean, Eastern Malleable Iron Co., Naugatuck, Conn., agreed that a more definitely determined yield point is desirable, but suggested that much of the present difficulty could be avoided if the method of determination were prescribed in the specifications. After prolonged discussion, Mr. Schwartz moved that the question of a more accurate means of ascertaining the yield point be referred to the American Foundrymen's association committee on malleable cast iron. The motion was adopted unanimously.

In discussing the paper, F. M. Robbins, Ross-Meehan Foundries, Chattanooga, Tenn., asked whether or not a reduction in the specifications for malleable would prove beneficial. Mr. Bean, while not favoring a reduction, declared retaining the present specification and writing another to cover castings of lower strength might meet the situation. Edward Halsey, Terre Haute Malleable & Mfg. Co., Terre Haute, Ind., said that according to his experience, rejections were higher under the old specification than under the present one. Mr. Schwartz, while not committing himself on the question of specifications, declared that the important thing for the future of the malleable industry is to give the customer what he needs. W. P. Putnam, Detroit Testing Laboratories, Detroit, reported that an inquiry, which he made as chairman of committee A-7 of the American Society for Testing Materials, showed that only 50 per cent of the castings made are sold under specification.

Professor Touceda read a paper on the resistance of malleable to repeated impact stresses which also introduced a comparison of machined and rough castings. A discussion of the effect of phosphorus on malleable and of the prevention of surface shrinks ensued. A paper entitled, "A Study of Malleable Cast Iron" by Dr. O. Quadrat and J. Koritta, Prague, presented on behalf of the Czechoslovakian Foundrymen's association, was read by Mr. Bean in the absence of the authors.

About 60 practical and technical men attended the luncheon and round table discussion of malleable iron foundry problems, held Thursday at 12:15 p. m. In accordance with the established practice in connection with these luncheon discussions, names of the men participating are not mentioned.

Topics in the malleable industry brought up for discussion included the use of various fuels for melting and annealing and the comparison of powdered coal and hand firing. Most of the speakers favored the use of powdered coal because uniform conditions in the hearth may be maintained. Lower iron losses were found as was a lower refractory cost per ton of iron melted.

The effect of pouring temperatures on shrinkage was considered, but due to a number of factors in making the test bar, etc., it was decided that shrinkage determinations are impractical. The use of malleable scrap also was discussed and several of those present reported the use of from 25 to 30 per cent without any difficulty resulting. One point stressed in using malleable scrap was that the carbon relation in the charged metal must be such that metal of the proper analysis may be tapped from the furnace.

Iron loss was a topic that created considerable interest. Most men agreed on the difficulty of obtaining accurate figures on the amount of metal charged and the amount of metal removed from the furnace. One instance of a loss as low as 3½ per cent met with considerable skepticism and questions on the method of arriving at the result. The general concensus of opinion was that the average loss was 6 to 7 per cent.

Training Apprentices

ADOPTION of a system of training that will make the apprentice an economical asset rather than an economical liability is the basis of any plan that has any chance of being approved by owners and directors of plants where apprentices are required, according to J. C. Wright, federal director of vocational training, in opening the session devoted to this subject on Tuesday morning. In a general review of the situation he deplored the fact that boys consciously or unconsciously are prevented from entering the ranks of industry on account of mistaken views held by the parents and teachers regarding the dignity of honest labor. The chance to wear a white collar is extolled as a prize while a suit of overalls is considered a badge of inferiority, even though the stipend attached to the first position is not equal to the wages paid in the second. A general campaign to induce intelligent boys to learn skilled trades and to induce employers to take the boys into their plants and train them properly was suggested as a remedy for the condition.

Others who participated in the discussion included L. S. Harding who has charge of the activities of the Associated Industries of Massachusetts along the same line; George

Hayes vocational school director, Harvey, Ill.; C. J. Freund, apprentice superintendent Falk Corp., Milwaukee; John Ploehn, general superintendent, French & Hecht, Davenport, Iowa, and Paul M. Ramp, foundry manager Newport News Shipbuilding & Drydock Co., Newport News, Va.

The various directors of apprenticeship training outlined the methods adopted to suit local conditions in their various communities and without exception claimed that gratifying results already were in evidence where united and earnest effort had been made to interest both boys and employers. Many mistaken impressions entertained on both sides had been wiped out by co-operative effort.

Paul M. Ramp described the method he had instituted in his plant for the education of apprentices and showed pictures of large and difficult castings made by apprentices to prove his contentions that boys may be developed rapidly into competent journeymen.

Probe Steel Casting Defects

TUESDAY'S session on steel founding was attended by 75 men. R. A. Munson, Atlantic Steel Castings Co., Chester, Pa., read a paper on defects in steel castings in the foundry and attributed the causes of defects in steel castings to three main reasons, namely design of pattern equipment, molding and coreshop methods and melting and pouring conditions. J. M. Sampson, Schenectady, N. Y., had a similar paper referring to the defects in steel castings discovered after shipment from the foundry. He made an analysis of the conditions in the steel foundry, particularly with reference to rejections and salvaging work in machine shops. These papers were discussed jointly. Mr. Young, Detroit Steel Casting Co., Detroit, asked if trouble did not arise from rust on using horseshoe nails for internal chills. John Howe Hall mentioned that the use of horseshoe nails sometimes caused blowholes and external chills should be used in preference. Mr. Garrison, Riverside Steel Casting Co., Newark, N. J. stated that when horseshoe nails were used for preventing internal shrinkage, leakage occurred when pressure was used on the castings. Leon Cammen, American Society of Mechanical Engineers, New York, said that in his opinion much of the trouble occurred because the steel foundries did not insist on making patterns themselves, but allowed the customer, who does not understand foundry detail, to make the patterns. He thought that the steel foundries should make the patterns or insist on approving them before acceptance. He also thought that more research should be done on the conditions in the smaller open-hearth furnaces, as has been done on the larger sizes. R. A. Bull, Electric Steel Founders research group, read a paper on comments on past developments, present tendencies and future possibilities in the American steel foundries. This paper covered the pioneering in the industry, the progress made and how the future development of the industry will be related to the investigation of manufacturing distribution and performances.

Ancel St. John, New York, in discussing this paper, remarked that proper cost accounting should be maintained on research work so that investigation costs may be charged properly. Only in this way could the proper distribution of research funds be accounted for. He also gave some examples of the use of X-ray examination in discovering defects in small castings and by the use of this method the inspection was facilitated.

Study Steel Characteristics

Steel foundry metallurgy was the topic of discussion at the session Wednesday morning with A. H. Jameson, Deemer Steel Casting Co., New Castle, Del., chairman. C. M. Campbell, West Steel Casting Co., Cleveland, presented a paper on physical properties and compositions of cast converter steel. John Blair Industrial Works, Bay City, Mich., inquired the method of introducing ferromanganese and stated that his foundry experienced an occasional off-heat. This trouble was attributed to not using a uniform size of the ferro-alloy by R. A. Bull, director, Electric Steel Founders' Research group.

Ralph West, West Steel Casting Co., stated that in his opinion, the success obtained in his plant was due to the rapidity in which the operations were performed. The slags were kept thin so that when wet ferromanganese was added, it entered the bath properly. W. B. Coleman, W. B. Coleman, & Co., Philadelphia, asked about the quantity of silicon used. Mr. Campbell replied that the recovery of silicon was approximately that added and that in case of high silicon iron with a short hard blow, the tendency of the oxygen was to unite with the carbon and leave the heat wet or high in silicon.

Open hearth slags was the subject of a paper by W. C. Hamilton, American Steel Foundries, East Chicago, Ind., in which he stated that he found no difference in the iron oxide content of a black slag and a light colored one. Mr. Coleman said that he had used gravel-sized ferromanganese in trying to clear up a black slag without any results.

The final paper was that of John Howe Hall, Taylor-Wharton Iron & Steel Co., High Bridge, N. J., in which he described some tests that were carried out on manganese steels with manganese from 1 to 2 per cent.

Foreign Discussions

ON TUESDAY Robert Ronceray, Saginaw Products Co., Saginaw, Mich., presided over the foreign language session, at which the papers and discussion were presented in French. C. H. Gale, an old time foundryman of Detroit, presented a paper entitled "Early French History of Detroit." After this paper the meeting took the form of a round table discussion and several important problems were discussed including the relative value of cast iron and aluminum automobile pistons, the use of the electric furnace in a malleable iron foundry and the practice of blowing cores. E. V. Ronceray, managing director Etablissements Bonvillain et Ronceray, rue Paul-Carle, Choisy-le-Roi, near Paris; and H. Saint-Clivier, manager of Acieries de Firminy, Firminy, Loire, took prominent parts in the discussion.

The German language session held Wednesday afternoon attracted more than 50 of the German, Austrian and Dutch founders and interested Americans. Dr. Richard Moldenke, Watchung, N. J. presided, assisted by Dr. Ing Geilenkirchen, Verein Deutscher Eisengiessereien, the employers organization of Germany and Dr. L.

Zerzog, Verein Deutscher Giessereifachleute, the technical society devoted to foundry matters. The latter gentlemen complimented Dr. Moldenke for his services in promoting this international exchange of ideas. Ing. C. Irresberger, Salzberg, raised the question of whether the American practice, particularly as followed with large cupolas did not produce an iron which was too hot. Dr. Moldenke impressed the fact that many classes of work, notably radiator work require this condition. He stated that better quality of coke is obtained in this country and that the coke ratio of 1 to 5 or 6 as against 1 to 10 or 11 in Germany shows that in this country coke is sacrificed in the interest of iron quality. Dr. Moldenke deprecated the practice of putting all the iron at the outer circumference of the cupola.

In response to a question, Dr. Moldenke stated that two types of coke, designed to influence the pick-up of carbon in the cupola are not used, and that coke producers do not make a study to provide certain grades of coke to meet foundry requirements. Dir. Dr. Greiner, Machinenfabrik Esslingen, Esslingen-Neckar told of the use of briquettes of ferrosilicon designed to retain their solidity until they reached the melting zone of the cupola and thus avoid losses. One of his countrymen stated that such briquettes might be used successfully in the air furnace but doubted their benefit in cupola melted metal.

See Progress in Cost Finding

INCREASING interests of foundrymen in exact costing methods and the growing realization of the need for a uniform cost system for foundries were displayed at the Wednesday afternoon session on foundry costs, by fully 175 foundrymen. E. W. McCullough, manager of the department of manufacture, chamber of commerce of the United States, Washington, presented a paper on "Progress of Cost Accounting in Industry." Mr. McCullough declared the secret of production at lowest cost lies in initiative and cost accounting and real cost accounting does not only mean writing operating history, but also finding and elminating waste and expediting production. Quoting W. J. Corbett, secretary-treasurer, Steel Founders Society of America, Pittsburgh, it was stated an effective foundry cost system should ascertain the cost of making castings and the consumption of materials, should measure labor efficiency, help correct faulty operating methods, provide comparative records and furnish data for intelligent merchandising. To build up a uniform cost system in the industry, Mr. McCullough stated it first is necessary to sell the industry on the proposition and, second, to set up a cost committee to develop its use. More than 125 trade associations to date have adopted cost systems, it was pointed out, and the jobbing foundry which does not know its own exact costs is pursuing unsafe practices.

"Foundry Cost Accounting" was the title of a paper read by Robert E. Belt, American Malleable Castings association, Cleveland. The foundry industry, Mr. Belt reminded, is highly competitive and to market castings without a knowledge of what it costs to produce them is hazardous. The author presented a detailed but simple cost accounting plan for foundries including classification of accounts, and complete description of the necessary forms accompanying the system.

In the discussion following Mr. Belt's paper, the author answered a question of J. Fletcher Harper, Allis-Chalmers Mfg. Co., Milwaukee, by stating that large foundries find it necessary to include, in monthly production, both commercial and plant tonnage, and recommended keeping separate costs on shop equipment. When shop castings are broken up and returned, he said, they should be carried at scrap value, the differential being absorbed in some way, perhaps under depreciation on equipment used in service.

A question of E. B. Hazen, Brass Foundry Co., Peoria, Ill., elicited the reply that where unit floor space is well defined the return per floor day is a better criterion of work profit than a percentage of profit on cost. In some cases, he said, the percentage basis gives an inadequate return, as where the units of floor space are not well defined. In this view Chairman A. E. Hageboeck, Frank Foundries Corp., East Moline, Ill., coincided, stating that it is wrong to add so much per pound of castings regardless of the cost.

At this session a resolution was adopted unanimously stating that it is a function of the American Foundrymen's association to assist materially in the adoption of a uniform cost system by the foundrymen, it being the sense of the meeting that a committee on costs be appointed to proceed with the work of interesting foundrymen in costing methods, preferably through the local foundry group method, J. L. Carter, Barlow Foundry Co., Newark, N. J., in dis-

Foundrymen Guess Weight of Castings

Five patterns for making castings in malleable iron, gray iron, steel, brass and aluminum were displayed in the American Foundrymen's cost committee both at the Detroit convention. Visitors were requested to estimate the weight of the castings and the production which should be secured from the equipment. Suitable prizes were offered for the best guess. Description of prizes, weights of castings and names of winners and near winners are shown in the accompanying table.

PRIZE	Actual Weight Pounds	Guess Pounds	Kind of Castings	WINNER
1st Prize—Writing Set.....	20	20	Malleable	C. P. Ziegler, Grand Rapids Fdy., Grand Rapids, Mich.
2nd Prize—Gladstone Bag...	38½	38	Brass	John Caswell, Chamberlain Co., Los Angeles, Calif.
3rd Prize—Traveling Bag ...	200½	200	Gray Iron	Leonard Pitt, Carborundum Co. Niagara Falls, N. Y.
4th Prize—Two Umbrellas..	143½	144	Steel	E. G. Weghorst, Simons Paint Spray Brush Co., Dayton, Ohio
5th Prize—Mantel Clock....	6.2 (100 oz.)	6 (96 oz.)	Aluminum	A. P. Grimm, A. P. Grimm Fdy. Co., Bound Brook, N. J.

Tie on Malleable Casting—five guessed weight of 20 pounds. Winner chosen by drawing.

Those guessing 20 pounds

Alfred Simon, Crunstadt, Germany
J. Prendergast, Sullivan Mch. Co., Claremont, N. H.
Fred A. Cowen, Warner R. Thompson Co., Detroit, Mich.
K. W. Clark, H. W. Clark Co., Mattoon, Ill.

Two guessed 38 pounds on Brass Casting. The winner was drawn. The other guess was made by

George C. Johnson, Johnson Fdy., Los Angeles, Calif.

Range of Guess

Malleable....	4½ to 47 pounds
Brass.....	7 to 85 pounds
Gray Iron....	28 to 382 pounds
Steel.....	78 to 319 pounds
Aluminum....	1¼ to 60 pounds

cussing the resolution, stated that uniform cost adoption is coming largely through the medium of local foundrymen's associations.

S. R. Francis, Hoyt Metals Co., Toronto, Canada, represented nonferrous foundrymen in stating that his industry vitally needs uniform cost methods because of great variations of costs in casting nonferrous metal. H. D. Twitchell, H. P. Deuscher Co., Hamilton, O., also discussed this resolution.

Upon presentation of the question by A. B. Root, Jr., president of the American Foundrymen's association, the meeting voted approval of the plan offered whereby foundries should insert weights on casting blueprints in figuring jobs. Considerable discussion attended the plan, H. V. Crawford, General Electric Co., Schenectady, N. Y., opposing the matter on the grounds of cost, uncertainty as to the weight of castings ascertainable from the dimensions of finished parts and allowances for machining.

Speakers approving the proposed plan in discussion were: H. L. Parr, Standard Calorimeter Co., East Moline, Ill.; E. B. Hazen, Brass Foundry Co., Peoria, Ill., J. L. Carter, Barlow Foundry Co., Newark, N. J.; B. G. Parker, general manager, Youngstown Foundry & Machine Co., Youngstown, O., and Leon S. Hull, Climax Engineering Co., Clinton, Iowa. President Root, in presenting the plan, stated that of 7800 questionnaires sent out by the association, some 2000 were returned, of which 1800 approved, 112 opposed, and 34 approved the suggestion with modifications. The principal opposition, it appeared, was on the grounds of frequent alterations requiring increased clerical work. A plan modified from the original was offered because of the great size and wide scope of some of the plants of the main objectors.

Instructors Consider Problems

INSTRUCTORS in foundry theory and practice in nine colleges, universities and technical schools met Tuesday evening at dinner at the Book-Cadillac hotel, where they discussed with several practical foundrymen the betterment of present foundry shop courses of instruction. O. W. Boston, University of Michigan, Ann Arbor, Mich., presided over the session. John Mehrtens, Berlin, Germany, was the sole representative of the visiting delegation of foreign foundrymen.

Four papers were read following the dinner, the first, Training for Foundry Executives, by William H. Dosey, college of industries, Carnegie Institute of Technology, Pittsburgh, being descriptive of that institution's efforts to train men for industrial production. In his paper on Foundry Instruction at Purdue University, R. E. Wendt, foundry instructor, Purdue university, West Lafayette, Ind., detailed the methods and aims of a fundamental principle course offered by that institution in the manufacture of castings. The course described includes practical work in molding, coremaking, cupola operation and determination of melting losses and ratios.

A Course on Cast Metal was described by H. L. Campbell, assistant professor of metallurgical engineering, University of Michigan, Ann Arbor, Mich. This course, the author stated, is designed to teach principles of foundry operations and the different practices used in making castings of gray iron, malleable iron, steel, brass, bronze and aluminum alloys. The fourth paper was presented by Henry O. Haughton, Studebaker Corp., South Bend, Ind., formerly superintendent of foundry laboratory, University of Illinois, Urbana, Ill., on Foundry Instruction at the University of Illinois. Mr. Haughton gave as the main objects of instruction the training in fundamental principles underlying quantity production of castings by modern methods. The feature of instruction is its joint administration with the course of pattern work.

Extended discussion followed the reading of these papers. R. E.

Committee Report on Apprentice Casting Contest

Eight iron and three steel castings were submitted in the apprentice molding contest conducted by the American Foundrymen's association and represented interest taken by the General Electric Co., Erie, Pa., New England Foundrymen's association; Milwaukee Metal Trades association; Pusey & Jones, Wilmington, Del.; Quad City Foundrymen's association, Davenport, Iowa.

The patterns used for all the iron castings were exact duplicates of each other and the patterns for the steel castings were made in a similar manner to standardize the contest as far as possible. Character of sand, style of gates and many other details were left to the individual judgment of the molder.

Steel castings came from the Milwaukee district. Apprentices from industrial plants in the city made the molds in the foundry connected with the vocational school and poured them from metal melted in an electric steel furnace. Your committee notes that the metal was cold in each case and therefore the surface of the casing is impaired. After making due allowance for this feature the first prize was awarded to No. 101 C. Fuerst, Falk Corp., the second prize to No. 100, M. Rebhein, Bucyrus Corp., and the third prize to the maker of the reaming casting, A. Bottani, Falk Corp. Names of the contestants were not given on the identification card which accompanied each casting in a sealed envelope.

Out of the eight iron castings, three were selected as representing the best appearance. Only minor imperfections differentiated the second and third from the first. All three were excellent castings. The first prize was awarded to contestant No. 400, James R. Loveland, the second to No. 401, F. Cordel Gillette, and the third to No. 403, Elmer De Wolfe. Singularly enough when the envelopes accompanying the castings were opened it was discovered that all three castings came from the General Electric Co., Erie, Pa.

Respectfully submitted

EUGENE SMITH,
PAT DWYER,
BENJAMIN D. FULLER, *Chairman.*

Kennedy, technical secretary, American Foundrymen's association, Urbana, Ill., declared that for the cost of shop work to be justified by its practical engineering value, more effort should be placed on shop work by working out a laboratory scheme to give information on the differences in castings metals. Mr. Haughton's paper aroused considerable comment as to the methods used in producing an engine casting, a question by A. E. Wells, Cornell university, Ithaca, N. Y., eliciting the information that at Illinois a student foundry foreman is selected to act over a definite period of time rather than over the production of an entire engine.

C. J. Freund, of the Falk Corp., Milwaukee, stated that the average engineering graduate has no understanding of or sympathy with manual labor problems, and be urged that engineering instruction should bring to the student a deeper appreciation of the importance of foundry work as a fundamental of all manufacture. This opinion was not shared by Maj. Bruce W. Benedict, University of Illinois, who declared that with shop foundry operation costing $35 an hour and the shop laboratory $80 an hour, the foundry industry itself should teach manual work. Major Benedict said that shop work in technical schools today is under fire and that any foundry course must teach the making of good castings.

Dean C. B. Connelley, Carnegie Institute of Technology, Pittsburgh, declared that engineering itself is under fire, and told of a recent research fund of over $100,000 set up to determine just what kind of training an engineer should have. An interesting suggestion was made by O. W. Potter, University of Minnesota, Minneapolis, who offered the idea that on completion of four years of engineering work the student should spend two years in industry, as a doctor spends two years as a hospital interne, before receiving his engineering degree. H. A. Frommelt, International Correspondence Schools, Davenport, Iowa, declared that industry is at least 50 per cent to blame for the present failure to offer some means of bridging the gap between engineering training and application.

Discuss Nonferrous Founding

THE outstanding feature of the aluminum session of the joint meeting held Monday was a paper on aluminum castings of high strength by Robert S. Archer, Aluminum Co. of America, Cleveland. The introduction of iron up to about 1.25 per cent to the alloy containing 8 per cent copper and 92 per cent aluminum was mentioned as desirable, as it acts to prevent the cracking of castings, a conclusion confirmed by extensive foundry experience. George Klenk, brass foundry superintendent, Allis-Chalmers Co., West Allis, Wis., wanted to learn how best to add this iron, whether in the metallic form or incorporated as a *rich alloy* with other component metals. It does not matter how it is added, declared Mr. Archer, so long as it is properly alloyed. When added in the shape of iron wire, or thin sheet iron it is essential to see that the iron is perfectly clean. These are both good forms in which to add it. Tin plate scrap also is suitable, the small amount of tin carried in by this form of iron not being injurious.

A symposium held Tuesday morning dealing with nonferrous temperature determination was covered by six papers, five of which dealt with pyrometers and one with visual judgment of metal temperatures. Several different types of pyrometers were described and their advantages stressed. The closed end couple and the open end couple pyrometers both found favor. It was conceded the closed end couple is not suitable for use in phosphor bronze of high phosphorus content, and it was the opinion of H. M. St. John, Detroit Lubricator Co., Detroit, that the open end couple is the only one suitable for this type of alloy. Mr. St. John further stated that while it costs his company around $5000 yearly to conduct pyrometric observations of metal temperatures, it realizes a saving of five times that amount. Both Mr. St. John and N. K. B. Patch, Lumen Bearing Co., Buffalo, found that open end couples could be calibrated to the melting point of copper satisfactorily by winding copper wire around them and then heating to the melting point in a suitable furnace.

Talk on Silver Alloys

At the Wednesday session of the Institute of Metals division of the American Institute of Mechanical Engineering Dr. W. Guertler, Charlottenburg, Germany, discussed new developments in silver alloys. The lecturer stated that as little work had been done in the development of silver alloys there was a possibility of alloys of commercial value being discovered, and he outlined some of the work he had done. T. A. White asked about the possibility of producing silver alloys that would not tarnish in the presence of hydrogen sulphide, but little hope was held out by Dr. Guertler in this direction, as the only metals that can be added to silver to obtain such alloys are palladium, platinum and gold, and the amount of these metals required to produce a non-tarnishing alloy is so great the admixture is too costly for commercial use. The English non-tarnishing silver alloy was stated by Mr. White to contain zinc and antimony and to tarnish quite badly when laid away for any considerable period.

About 125 foundrymen and foundry executives attended the round table discussion on brass foundry topics Tuesday noon in the Machinery Annex. In the absence of the late George K. Elliott, past chairman of the Institute of Metals division of the American Institute of Mining and Metallurgical engineers, and for many years chief metallurgist and head of the chemical department of Lunkenheimer Co., Cincinnati, N. K. B. Patch, Lumen Bearings Co., Buffalo, presided over the meeting. W. F. Roeser, assistant physicist, bureau of standards, department of commerce, Washington, read his paper on "Pyrometric Control in the Foundry," which he was unable to present at the morning symposium on determination of temperatures in the nonferrous foundry. The author described recent research work conducted at some 24 different foundries on uses of pyrometers in nonferrous melting operations. He found considerable variance in the methods used by individual foundries, some of them decidedly detrimental to accurate determination of heats. Mr. Roeser stated that progress in foundry pyrometry depends chiefly on the progressive spirit of foundrymen in general and urged a more accurate accumulation of data obtained through the use of thermocouple equipment in foundry practice.

Great interest was displayed at the round table discussion over the difficulties associated with meeting melting specifications of high-lead alloys. It was brought out that considerable trouble has been experienced

by many foundry metallurgists in securing in these alloys a segregation of lead particles which would prove satisfactory to customers under photomicrographic observation. The use of sulphur in obtaining proper lead segregation was mentioned and approved. Another and more recent method was suggested, that of treating the lead with hydrogen prior to mixing the lead with the melt. The latter process was recommended from the scrap reclamation standpoint because it eliminates the possibility of getting sulphur-treated metals into scrap melts.

Some difference of opinion arose over the question of what constitutes a chilled and a non-chilled casting. In the opinion of one speaker who has conducted some experimental work on the subject, the chilling action is directly attributable to the sand used, a dry sand core having a greater chilling effect because of a higher heat conductivity. Another speaker felt that chilling was the result of conditions other than the conductivity of sand.

An inquiry of one foundryman present as to an easy way to distinguish aluminum-bronze scrap from copper-tin scrap constituted a problem of which no solution was offered. The effect of nickel additions to red brass also was dicussed.

Investigate Permanent Molds

APPROXIMATELY 200 attended the symposium on permanent and long life molds Tuesday afternoon which was presided over by Jesse L. Jones, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. Dr. Richard Moldenke Watchung, N. J., summarized the position of these types of molds in the foundry industry, suggested some possible mold materials and the trends of experimental work.

A description of the semipermanent or durable mold was given by James A. Murphy, Hamilton, O. One mold used in making an 8-ton casting for glass manufacturer has been in use for 18 years and over 1000 castings produced from it. This mold was made of brick laid on a sand cushion, slushed with clay wash and coated with blacking.

Centrifugal pipe casting, as practiced in European countries, was described in a paper by J. E. Hurst, Kilmarnock, Scotland, which was abstracted by John Cameron, past president of the Institute of British Foundrymen, as Mr. Hurst was unable to be present. H. A. Schwartz, American Foundry Equipment Co., Mishawaka, Ind., read a paper on oil cooled cast iron permanent molds. The results obtained in practice and the application of the molds also was given.

Several Constructions Used

Investigations on a suitable medium for the construction of permanent molds for the castings of steel pipe and other products cast at high temperature were described by Leon Cammen, American Society of Mechanical Engineers, New York. R. Hara, Mitsubishi Denki Kaisha Ltd., Kobe, Japan, remarked that permanent molds of cast iron, bronze and stone were in use in Japan for casting small objects such as spoons, etc.

Metal for heavy iron castings in permanent molds was the topic of an illustrated paper read by S. M. Udale, Holley Carburetor Co., Detroit. H. P. Kimber was joint author of the paper. Mr. Winship, Thermal Syndicate Co., New York, suggested the use of fused silica for a refractory material for lining molds because of its low coefficient of thermal expansion. Gelatinous precipitated silica was recommended as a binder. The mold and lining then should be heated to a temperature considerably above the pouring temperature of the metal, to eliminate any water that may be present in the silica lining mixture.

Waste Elimination

IMMEDIATELY following the business session, Thursday afternoon, Dean C. B. Connelley called the waste elimination meeting to order and outlined the work which Herbert Hoover, secretary of commerce, is doing to lessen the losses in industry through the existence of too many types and sizes of various commodities. A. B. Root, Jr. told of the work of two committees organized by the department of commerce. The first of these is working to establish the practice of putting weights of castings on all blueprints. The second committee dealing with all questions of metals utilization is just getting under way.

S. W. Utley, Detroit Steel Castings Co., Detroit, elaborated Mr. Root's explanation of the work of the latter committee. He told of the preliminary investigation on shovels, which showed a total of 1100 types and sizes of shovels at present manufactured. He explained Mr. Hoover's attitude wherein he holds that simplification is a problem affecting most vitally the manufacturer and the consumer, and as such should be settled between them.

D. M. Avey, THE FOUNDRY, Cleveland, gave a short review of the work and aims of the joint committee on pattern standardization. H. Y. Carson, American Cast Iron Pipe Co., Birmingham, told of the soil corrosion investigation of the committee which he heads. After four years, 46 specimens of cast iron, steel and malleable iron pipe buried in various parts of the country under different soil conditions, have been inspected and only four types of soil have had any marked effect upon these various test pipes.

Hold Equipment Dinner

Monday evening of convention week long will be remembered for the most enjoyable and largest dinnner of the Foundry Equipment Manufacturers' association that has been held. More than 125 members and friends of that organization were entertained by performers engaged through the courtsey of H. W. Stannard, Northern Engineering Works, Detroit.

President S. T. Johnston acted as toastmaster and introduced A. B. Root Jr., president of the American Foundrymen's association, who called attention to the unique situation wherein the president of the equipment organization is the vice presidential nominee of the American Foundrymen's association. Mr. Root expressed the warm appreciation of the foundrymen for the splendid display of equipment which marks this as the greatest of all foundry shows.

John A. Penton, called upon impromptu by Toastmaster Johnton, presented his viewpoints as first secretary of the American Foundrymen's association, recollecting the first display of foundry equipment, held at the second American Foundrymen's association convention in Detroit in

1897. He remarked upon the strides which have been made in labor saving, production and handling machinery for foundries, giving greater advances than in any other branch of the metal working industry.

Two foreign manufacturers of foundry equipment were at the convention. One of these, E. V. Ronceray, president and managing director, S. A. des Etablissements Bonvillian et Ronceray, Choisy-le-Roi, France, spoke in complimentary terms of the magnificent display offered at the Detroit show this year. Mr. Ronceray, who was in America to attend a meeting of the American Foundrymen's association in 1907, returned to his own country so convinced of the service of the association to the industry, that he took the lead in establishing a similar society of foundrymen in France. He expressed the wish that he might return this time to take back the lesson and inspiration of the Foundry Equipment Manufacturers' association to his countrymen.

Display Association Activities

ACTIVITIES of various committees of the American Foundrymen's association and other organizations, whose work is related closely to that society, were given prominence in the Poultry building, which also housed the registration headquarters of the convention. Equipment and literature describing the work being done by the organizations represented filled the booths on one side of the building and created considerable interest among the foundrymen present.

The joint committee on molding sand research showed a number of machines which are used in making tests on molding sand which have been developed by this committee. The machines exhibited included a permeability machine, a special testing machine, a rotary tapping sieve machine, a machine for determining the bonding strength of the sand and literature on testing molding sand. The University of Michigan, Ann Arbor, Mich., showed apparatus for testing cores and core sand, a machine for breaking cores, various types of core oils and core boxes. Included was a testing device for determining the green strength of cores made with cereal binders.

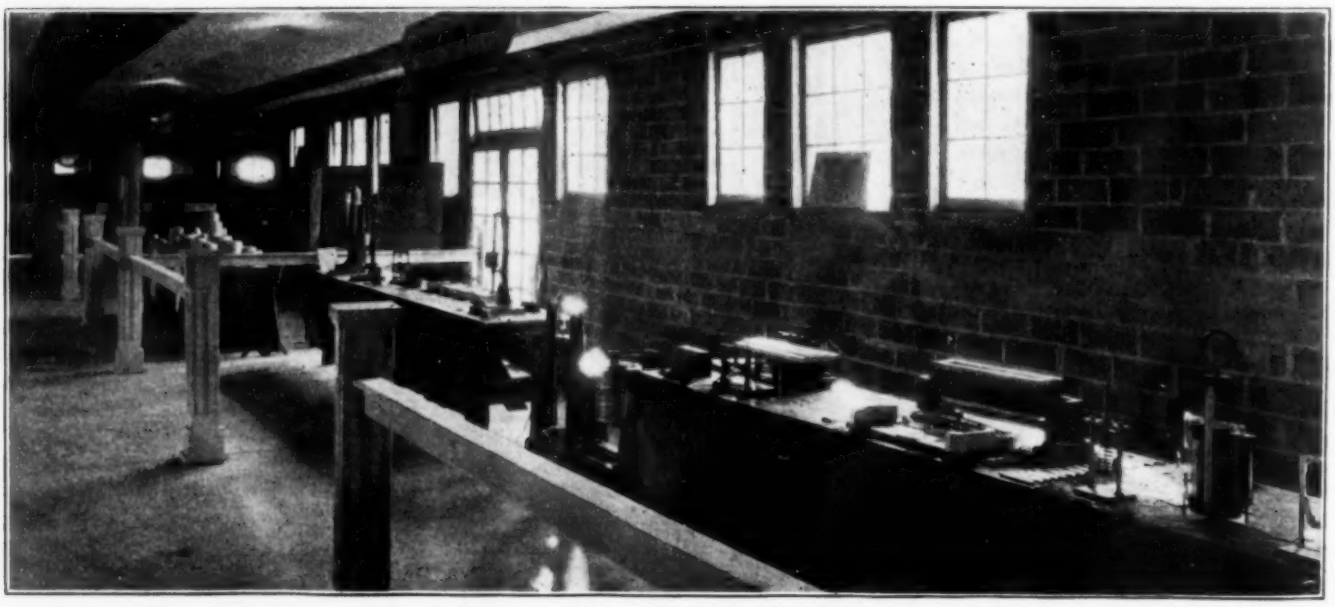
Gray iron and steel castings entered in the contest conducted by the committee on apprenticeship training were shown at the booth of that committee. The joint committee on pattern standardization exhibited charts showing fillet sizes, standard sizes for core prints, standard sizes for steel dowel pins for metal patterns, etc. The pattern color chart recently adopted also was shown. The four devices entered in the American Foundrymen's association Obermayer prize contest also were shown at this booth. These consisted of a self-forming sprue, a tilting spout for a cupola, a safety insulated pouring ladle and a device for closing the bottom of the cupola, the prize being awarded for the latter device.

Standardization Needed

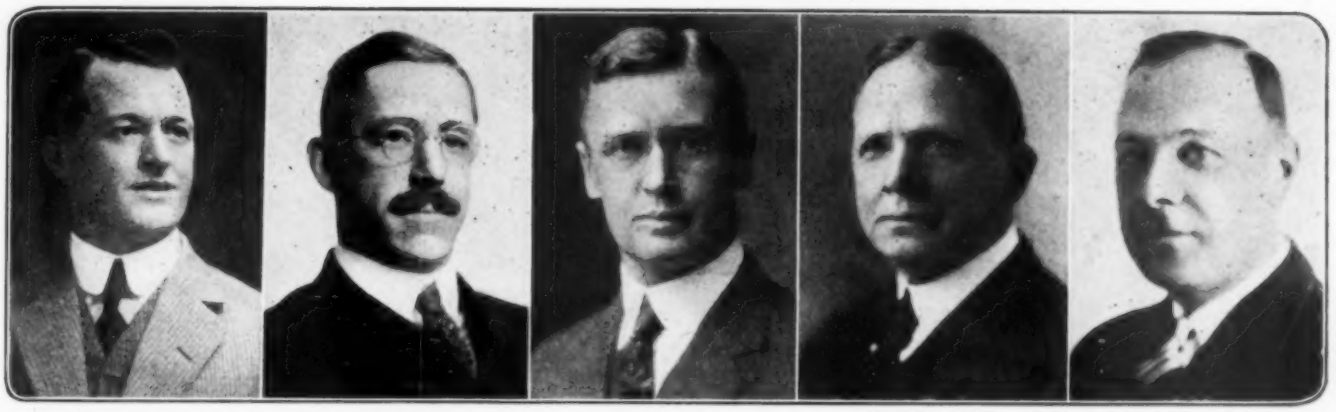
The joint committee on foundry refractories showed the need for standardization in this department of the industry. The committee showed eight different stopper rod assemblies secured from eight different steel foundries in the United States. All of the assemblies were different but were designed for the same purpose. The committee also showed a few of the many styles of stoppers made by one company, a line of nozzles made by one company, blue prints of a variety of bung brick for malleable furnaces supplied by one refractory manufacturer, blue prints of a variety of tap out blocks for malleable furnaces supplied by one company and a section of the top for an air furnace.

The cost committee of the American Foundrymen's association maintained a booth where the guessing contest was conducted. The contest and the winners are listed elsewhere in this issue of THE FOUNDRY. Verein Deutscher Eisengressereien showed the work it is doing through charts of patterns, coreboxes and castings and books. The Association Technique de Fonderie de France showed literature on foundry work.

The National Founders association and the National Safety council showed safety appliances such as goggles, shoes, first aid materials, signs, charts and pamphlets. The Ohio State Foundrymen's association also maintained a booth.



Machines For Making Molding Sand Tests Were Shown in the Registration Building



Martin W. Henley *N. K. B. Patch* *A. B. Root Jr.* *S. C. Vessy* *L. C. Wilson*

A. F. A. Elects New Directors

ELECTION of five new directors of the American Foundrymen's association for the 3-year term was announced at the business meeting held on Thursday. These men will take office at the annual meeting of the board of directors which will be held within 90 days.

Martin W. Henley

Martin W. Henley one of the five new directors elected for a 3-year term in the American Foundrymen's association has been connected with the foundry industry continuously since 1896. He was elected treasurer of the Frazer & Jones Co., Syracuse, N. Y., in 1910 and has held this office and that of vice president since 1919. He has been identified closely with the Manufacturers' association of Syracuse, N. Y. for many years; also the Syracuse Foundrymen's association and has served as president of both.

Nathaniel K. B. Patch

Nathaniel K. B. Patch has been connected with the brass foundry industry ever since he graduated from the Massachusetts Institute of Technology, Boston. His preparatory education was secured in the public and high schools of Buffalo. He entered the employment of the Lumen Bearing Co., Buffalo, at the time this organization first was started and has remained constantly with it since that time. He spent four years as salesman and in 1904 was appointed manager of the Canadian plant of the company. Later he was promoted to the position of general superintendent of the Buffalo plant and afterward was made works manager. On account of impaired sight he retired from the position of works manager in 1923 and assumed the duties of secretary and advertising manager.

Mr. Patch always has been prominently identified with technical associations connected with the brass founding industry. He was one of the organizers of the American Brass Founders association, was elected one of the first directors and served as president in 1911.

S. C. Vessy

S. C. Vessy, one of the newly elected directors was born at Warren, O., in 1866. He received his education in the public schools of Ohio, at Western Reserve seminary and Grand River institute. After completing a course in law, Mr. Vessy was admitted to the Ohio bar in 1891. At this time he removed to Cleveland and engaged in general practice of law for about twenty-five years, representing many manufacturing and industrial organizations, including the W. W. Sly Mfg. Co. Following the death of W. C. Sly in 1920, Mr. Vessy was selected as president of the W. W. Sly Mfg. Corp.

Mr. Vessy for years has been actively interested in the American Foundrymen's association, and served as a member of the Exhibits committee in 1925-26.

A. B. Root Jr.

A. B. Root, Jr., who was president of the American Foundrymens association for the past year 1926 was elected to the board of directors for the coming 3-year term. Although more particularly interested in the engineering phases of the industry, he has taken an active part during the last decade in the development and progress of casting manufacture.

Mr. Root has risen to a position of prominence in the casting industry through his affiliation with the Hunt-Spiller Mfg. Corp., Boston.

Mr. Root was born in Boston in 1886. He was a graduate from Tufts college, Massachusetts, in 1909, and shortly after became engineer of maintenance of way for the Boston & Albany railroad. He then became resident engineer of the Stone & Webster Engineering Corp., Boston, in charge of hydroelectric and steam power plant construction throughout the western and southern states. In 1913 he went with the Hunt-Spiller Mfg. Corp. as mechanical engineer.

In 1919 Mr. Root was elected president of the New England Foundrymen's association and later, in the same year, was made a director of the American Foundrymen's association. In 1922 he was re-elected a director, was made vice president in 1925 and president in 1926.

L. C. Wilson

L. C. Wilson, director-elect of the American Foundrymen's association for the three year-year period 1926-1928, secured his preparatory education in the schools of New Haven, Conn. and his technical training in the Sheffield Scientific school, Yale university from which he was graduated in 1907 with the degree of B. S., in mechanical engineering. Upon completing his work at Yale, Mr. Wilson entered the sales department of the Harbison-Walker Refractories Co., and represented this company over a period of years in the Pittsburgh, Chicago, New York and New Haven, Conn. districts. Later he joined the staff of the Chain Belt Co., Milwaukee, as assistant to the vice president and afterward was made general sales manager. Transferring to the Federal Malleable Co., Milwaukee as secretary he later was elected vice president and general manager and still retains that position.

The Dairy Building Was Filled With a Variety of Operating Equipment

Show Greatest in History

Exhibition Held in Conjunction with Convention of American Foundrymen's Association Beats All Records

THAT rapid progress is being made toward the complete mechanical operation of processes in the foundry industry never was better exemplified than at the Detroit exhibition, the greatest in the history of the American Foundrymen's association. With three large buildings providing in excess of 83,000 square feet of floor space devoted to the display of every conceivable type of equipment, foundrymen of many countries were shown the remarkable strides being made in the field.

While a study of the exhibits indicated that the manufacturers of every line of equipment have given considerable time and money to develop new machines to meet the ever changing needs of the founder of metals and to perfect refinements on equipment which already has proved its worth, several characteristics, which distinguished the Detroit show from those of the past, could not escape the exhibition visitor.

The large exhibits of molding machines with the remarkable variety of types were a revelation to many. Adapting the simpler work to machines long since has ceased to be a problem and now the most difficult castings are being molded on machines on a production basis considered impossible just a few years ago. Transportation of materials in the foundry is becoming less of a problem as all types of conveyors, hoists, cranes and trucks are adapted to new uses and new equipment is introduced. Operating equipment at the 1926 exhibit showed handling equipment for sand, molds, and other materials requiring movement through the plant.

Feature Operating Equipment

WHILE nothing new or of a radically different character was presented in the list of molding machines shown at the Detroit exhibition, still practically all makers of molding machines had added refinements to their designs. In some cases this was noted in their adaptation to use in connection with sand handling and conveying equipment and in others the tendency was toward greater simplicity, compactness and increased ease of operation.

Molding machine exhibit this year conforms more nearly to actual operating conditions and environment than at any previous show staged by manufacturers of foundry equipment. Instead of the usual cement or wood floor, the coliseum unit of the group of Michigan State Fair

buildings is provided with an ordinary dirt floor and the numerous piles of sand in the vicinity of the operating exhibits conferred an air of realism singularly appropriate and convincing.

Almost without exception the exhibiting units were on a larger scale than usual and fitted up in an elaborate manner to show the full possibilities of the machines either as individual pieces of equipment or in conjunction with sand handling and conveying equipment. For example the Osborn Mfg. Co., Cleveland, had a jolt-squeeze-stripper machine, a jolt stripper machine, jolt rollover pattern-draw machine, several jolt-squeezer machines and two plain jolt machines. One of the large machines was located under a sand handling piece of equipment which included a vertical loader feeding into a horizontal bar mill which in turn discharged the sand in a constant stream into a bin. A hand controlled gate in the bottom of the bin measured the correct amount of sand to fill the flask. To fill the flask the operator opens the gate. Rammed flasks were removed on a roller conveyor.

Wm. H. Nicholl's Co. Inc., Brooklyn, N. Y., occupied a large space in the coliseum building with an extensive line of molding machines and allied sand handling and conveying equipment. One exceptionally large jolt machine was equipped for making railroad car wheels and was provided with a roller conveyor for taking the flasks to the machine and removing them afterward.

Johnson & Jennings Co., Cleveland, operated several molding machines including a jolt squeeze, a jolt squeeze pattern drawn and a jolt squeeze roll-over pattern draw machine. New and ingenuous features have been incorporated in these machines for rolling the molds and removing the patterns.

As usual the performance of a large tractor type machine made by the Beardsley & Piper Co., Chicago attracted an interested gallery. This machine is not equipped with a sand loading device but carries a rectangular bin on top designed to be filled with a grab bucket.

Show Machines for Small Castings

Various types of machines designed principally for the production of small and medium sized castings were shown in the booths occupied by the Adams Co., Dubuque, Iowa; Arcade Mfg. Co., Freeport, Ill.; Berkshire Mfg. Co., Cleveland; Foundries Service Corp., New York; Grimes Molding Machine Co.; Detroit; Herman Pneumatic Machine Co., Pittsburgh; International Molding Machine Co., Chicago; Milwaukee Foundry Equipment Co., Milwaukee; Moline Iron Works, Moline, Ill. Wm. Demmler Bros., Kewanee, Ill., operated a battery of five machines in which the sand is blown into the coreboxes by compressed air.

Tabor Mfg. Co., Philadelphia, had an extensive line of molding machines near the center of the coliseum floor. The Stoney Foundry Engineering & Equipment Co., Cleveland, showed a typical shakeout bail, vibrator and a large special machine in which the vibrator principle is employed for knocking the burned cores out of large castings. Vibrator equipment also was shown by the Malleable Iron Fittings Co., Branford, Conn. Multiple core machine in operation and an adjustable core bench featured the exhibit of the Skeppstedt-Erickson Co., Moline, Ill. Sample cores were produced to demonstrate their extreme accuracy.

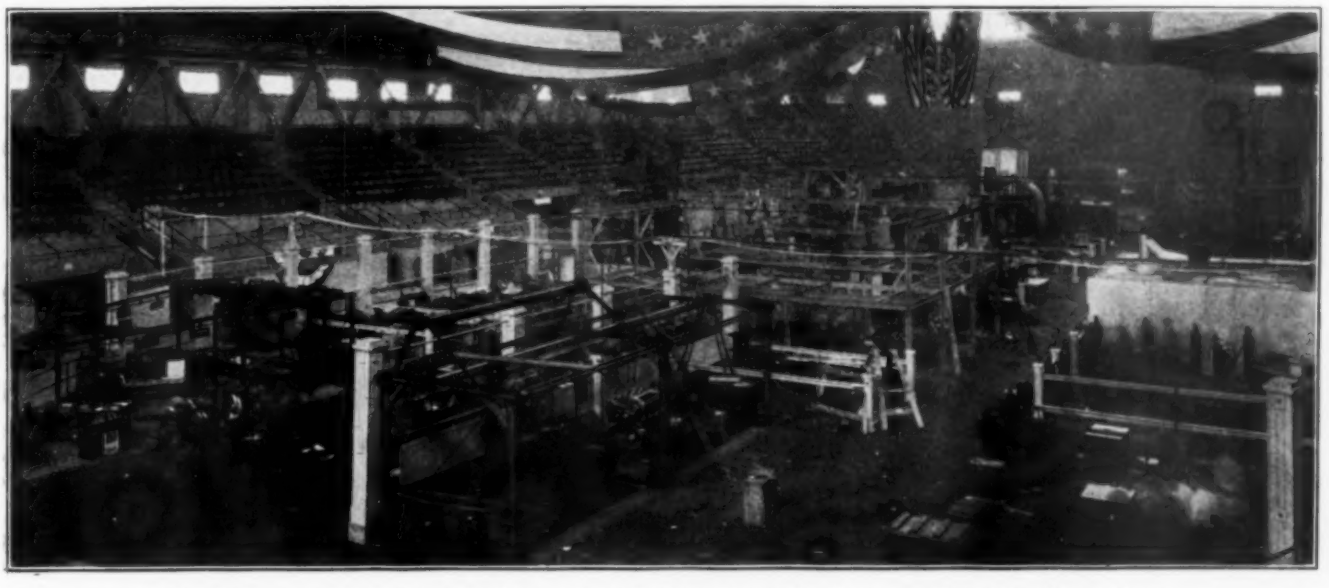
One foreign molding machine made by Franz Axmann, Cologne, Germany, attracted considerable attention. In addition to the novelty of its appearance in the United States where the manufacture of molding machines of various types has been developed to a high degree, it presented many points of interest.

C. O. Bartlett & Snow Co., Cleveland, had a complete sand treating plant on display, typical of many plants installed by the company in recent years including conveyor, elevator, revolving screen, water attachment and storage bin. An elaborate display of photographs illustrated continuous equipment for handling and preparing molding sand.

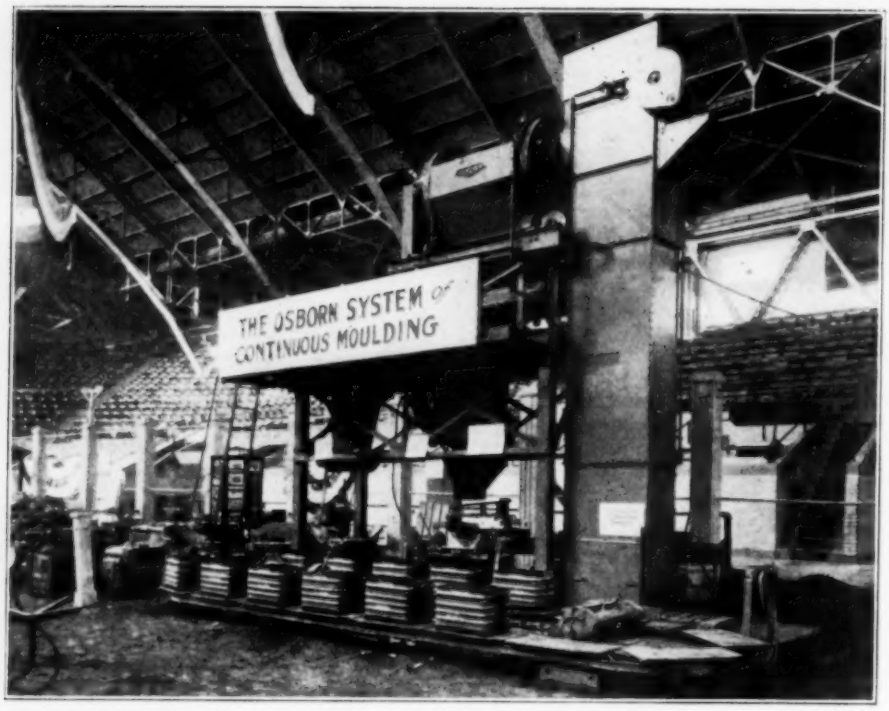
Standard and improved types of individual pieces of equipment designed for the preparation of molding and core sand were shown by the Blystone Mfg. Co., Cambridge Springs, Pa.; Standard Sand & Machine Co., Cleveland; Royer Foundry & Machine Co., Wilkes-Barre, Pa.; Lowe Mfg., Co., Detroit; and Great Western Mfg. Co., Leavenworth, Kans.

An extensive line of core making equipment was shown by the Wadsworth Core Machine & Equipment Co., Akron, O.

Miller-Hurst Corp., Detroit showed sand and mold handling equipment. The Link-Belt Co., Chicago had numerous photographs showing sand handling equipment installed in various foundries, also a new type vibrating screen, a speed reducer and a car spotter. A power conveyor erected on a rectangular space and carrying a number of flasks featured



Sand Floor and Extremely Large Installations Gave the Arena a Homelike Atmosphere



Molding Machines, Conveyors and Sand Handling Equipment Were Combined in This Exhibit

the display of the Mathews Conveyor Co., Ellwood City, Pa. The interesting exhibit of the National Engineering Co., Chicago, included a 6-foot diameter pan mixer with bucket loader, also one of baby size designed by the company for laboratory use.

The booth of the R. W. McIlvaine Co., Chicago, contained photographs of sand handling equipment manufactured and installed in many foundries. An electrical instrument for automatically controlling and recording the amount of moisture in molding sand and a working model of a sand conveyor with the moisture apparatus in position also was shown. Rudolph Geiger, Ravensburg, Germany, had two machines in operation for conditioning sand. The sand was fed into a hopper and came into contact with a rapidly revolving impeller which disintegrated the sand and threw it in a stream through a grating on the mouth of the machine. W. S. Tyler Co., Cleveland, showed an electrically operated vibrating screen primarily intended for use in the reclamation of used sand, a sieve shaker, a standard screen scale sieve, and a wide assortment of samples of screen.

Melting Equipment Is Varied

Considerable equipment for melting nonferrous metals was displayed. The melting units included furnaces fired by gas, and oil as well as electric furnaces. The Bellevue Industrial Furnace Co., Detroit, exhibited a tilting type brass melting furnace, an assortment of special shaped fire brick, and oil and gas burners for furnaces. A miniature model of an aluminum melting furnace with a fire brick lining and an oil burner also was shown. Several different types of melting furnaces were displayed by the Monarch Engineering & Mfg. Co., Baltimore. These included the oscillating type, a furnace for die-casting and a dross reclaiming furnace. Core ovens, sand sifters, ladle heaters and a blower also were exhibited. An oil-fired brass melting furnace with low pressure oil burners, motor-driven blowers and oil burning accessories constituted the display of the North American Mfg. Co., Cleveland. Campbell-Hausfeld Co., Harrison, O., exhibited a tilting type, crucible melting furnace, a stationary crucible melting furnace, cast iron pot aluminum melting furnace and a line of vibrators and oil straining devices.

A number of electric furnaces were displayed which included the induction and arc types. Ajax Electrothermic Corp., Trenton, N. J., exhibited a new model of a high frequency electric furnace for melting nonferrous metals. Several different sizes were shown ranging from a small portable furnace to a 636-pound size. A cross section of the furnace was presented to show the principle involved. The exhibition of the Detroit Electric Furnace Co., Detroit consisted of an electric furnace in operation showing the control equipment and transformers. Nonferrous castings made from metal melted in this type of furnace also were shown. Illustrative and descriptive matter pertaining to electric furnaces for heat treating was distributed by the Electric Furnace Co., Salem, O. One of the most interesting displays was that of the Pittsburgh Electric Furnace Corp., Pittsburgh. This firm had an electric furnace in continuous operation melting gray iron which was poured into permanent molds displayed by the Holley Carburetor Co., Detroit. A power demand limitator and a small size, laboratory type electric furnace also were shown.

Refractories and Clays Shown

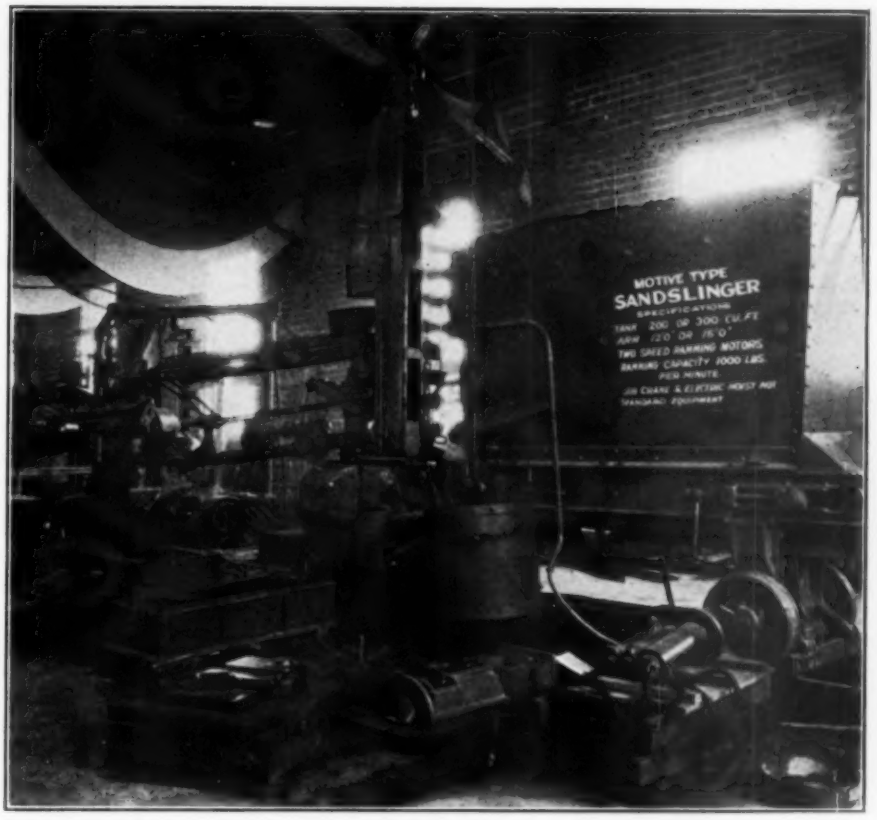
Effect of clay on old sand was demonstrated in a mulling machine by the Eastern Clay Products Co., Rochester, N. Y. Fire clay flour for the rebonding of molding sand was shown by the Illinois Clay Products Co., Joliet, Ill. This exhibit also included various fire clay preparations and furnace cements. Mt. Jewett Fire Clay Co., Mt. Jewett, Pa., displayed fire clays of different grades and finenesses for rebonding molding sands and other purposes. Refractory materials including high temperature cements, baffles and fire brick were shown by the King Refractories Co.,

Core Oils and Samples of Cores Created Considerable Interest

Buffalo. Special crucible and refractory brick constituted the display of the Electro Refractories Corp., Buffalo. An interesting feature of the exhibit of the Quigley Furnace Specialties Co., New York, was the scenic reproduction of the various industries requiring refractories. Demonstrations of high temperature cement and of solutions to prevent corrosion of metals and protect various surfaces also were made.

Graphite crucibles of various sizes and types were on display at the booth of the Joseph Dixon Crucible Co., Jersey City, N. J. A skimming cover of graphite to be placed in the crucible during the pouring operation also was shown. The Lava Crucible Co. of Pittsburgh, exhibited a complete line of pit and tilting type crucibles. Crucible covers, sleeves, skimmers and stirrers also were displayed. Graphite crucibles and special graphite refractories composed the display of the Chicago Crucible Co., Chicago. The Ross-Tacony Crucible Co., Tacony, Pa., showed crucibles for melting steel and various nonferrous metals, and graphite stopper heads for ladles.

Thermometers of all kinds, pyrometers, and temperature recording and regulating devices for various purposes were exhibited by the Taylor Instrument Co., Rochester, N. Y. Annealing pots of the open and of the bottom type constituted the display of the American Brake Shoe & Foundry Co., Chicago. The Carr Fastener Co., Cambridge, Mass., showed complete industrial lubrication service for foundry and other mechanical equipment. Pattern letters and figures, and foundry trademarks of white metal and brass composed the exhibit of H. W. Knight & Son, Seneca Falls, N. Y. The Mathieson Alkali Works, Inc., New York, exhibited a cupola flux manufactured by this firm, and showed the developments in the refining and desulphurizing of cast iron with this flux with pictures.

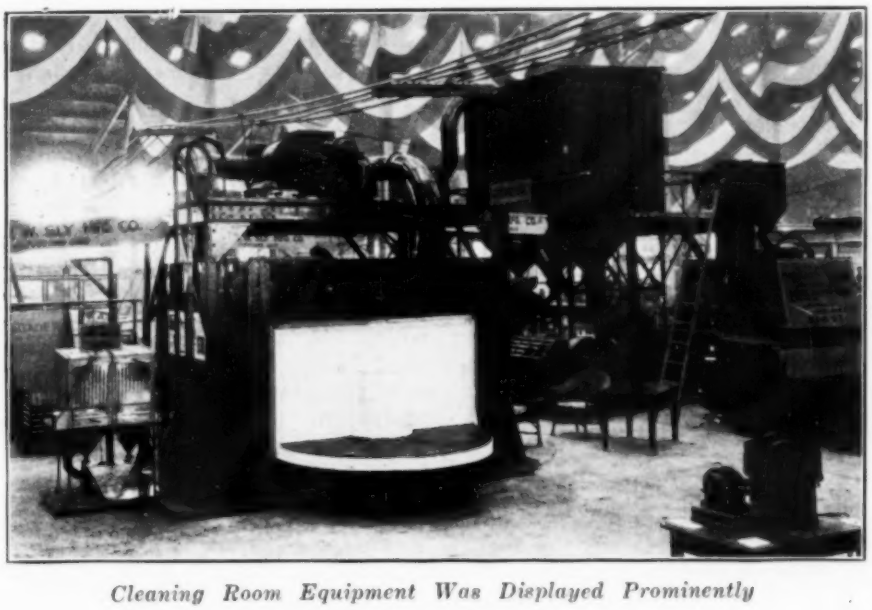


Visitors Were Impressed With the Size of this Molding Equipment

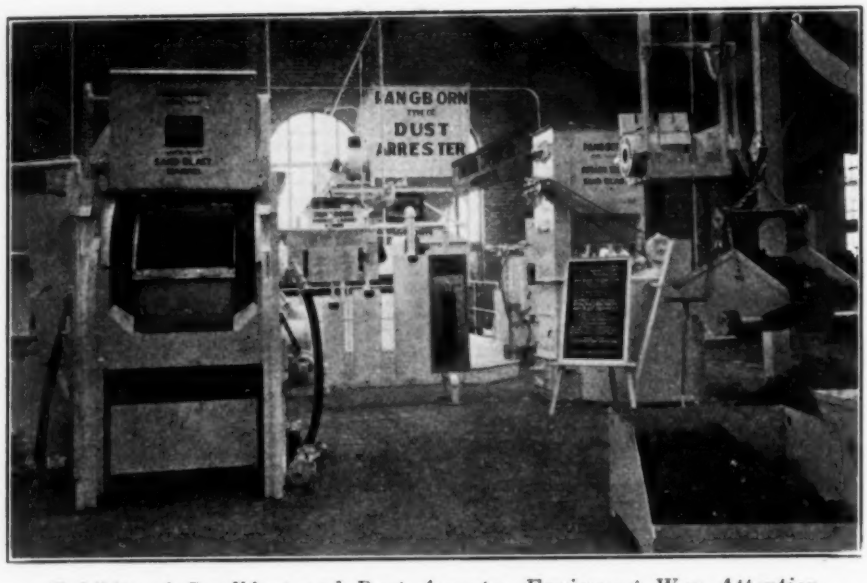
Exhibits Metals and Alloys

Firms displaying nonferrous metal and alloys, and alloying metals for gray iron were well represented. The International Nickel Co., New York, had an interesting display showing the effect of nickel on gray cast iron. This display was composed of a lathe on which the machinability of gray iron to which nickel was added, was demonstrated. Samples of iron and steel castings containing nickel were shown as was a new alloy cast iron developed by that company. Special metals and alloys, and welding compounds constituted the display of the Metal & Thermit Corp., New York. The exhibit of the Michigan Smelting & Refining Co., Detroit, consisted of ingot brass and bronze, die castings, bronze forgings, solder, tin, zinc, lead, aluminum and special alloy ingots. The Niagara Falls Smelting & Refining Corp., Buffalo, displayed various nonferrous metals and alloys, and some castings made from these metals. An elaborate display of castings of various sizes and shapes including acid proof and corrosion resisting pumps made from alloys and nonferrous metals manufactured by the firm as well as the ingot metals were exhibited by the Ajax Metal Co., Philadelphia. Virgin aluminum ingots and ingots of different shapes and grades of commercial purity constituted the display of the British Aluminum Co. Ltd., London, England. The Alloys & Products Co. Inc., New York, showed a large number of alloys used in brass foundry practice.

Due to the variety, size and various colors of paint, the displays of sandblast and dust arrester equipment in the dairy building and coliseum were exceptionally attractive. The display of the W. W. Sly Mfg.



Cleaning Room Equipment Was Displayed Prominently

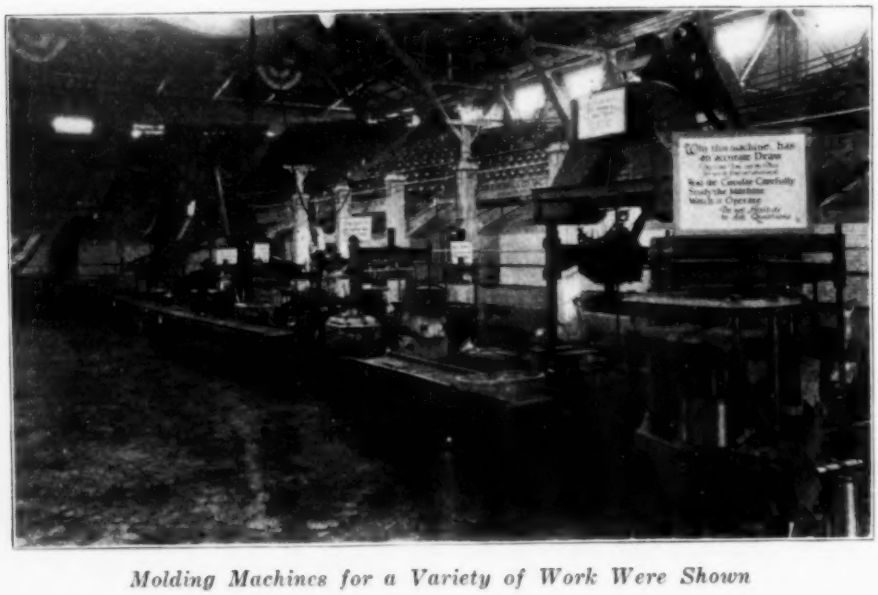


Exhibits of Sandblast and Dust Arrester Equipment Won Attention

Co., Cleveland, consisted of various types of sandblast mills, a complete sandblast room with turntable, a tumbling mill, a model dust arrester, and a complete pressure type rotary table with a separator and elevator. Another feature of this exhibit was a large molding sand reclaiming unit. In this installation, the sand first passes through a magnetic separator and a mixer and is fed into a hopper. From the hopper the sand is elevated to the separator where the sand is reclaimed. The dust and refuse sand is carried off by a dust arrester. A tilted sandblast barrel of the positive pressure type with the elevator and pressure tank was shown, as was a specially designed loading box for this type of equipment.

One feature of the exhibit of the Pangborn Corp., Hagerstown, Md., was a special loader for a direct pressure sandblast barrel. An electric hoist carried on a monorail, lifts a specially designed loading skip and carries it to the sandblast barrel where the load of castings is dumped into the barrel. After the castings are cleaned, the barrel is stopped with the opening at the bottom and the castings drop into a special container carried on a truck beneath the barrel. The company also displayed prominently a rotary sandblast table, a rotary cabinet type table with dust arrester equipment attached. This room is a combination of a rotary table and a cabinet unit, since the work may be carried into the room on a car or placed on the rotary table located at one end. After the work is cleaned it may be discharged from the room on the rotary table.

Several direct pressure sandblast units, a sandblast barrel, a radial sandblast barrel, a sandblast table room and a dust arrester installation, featured the display of the New Haven Sandblast Co., New Haven, Conn. The Ruemelin Mfg. Co., Minneapolis showed sandblast cabinets with plain and revolving tables, sandblast curtains, generators, guns, sand sifters and a number of exhaust fans and dust collectors.



Molding Machines for a Variety of Work Were Shown

The large exhibit of the American Foundry Equipment Co., Mishawaka, Ind., consisted of an automatic rotary sandblast table in operation, a sandblast room, a sandblast barrel, and a sandblast pressure tank unit. The company also showed cloth screen type dust arresters, a new core machine and several aluminum taper strip flasks. Three types of sand cutting machines were in operation on the arena floor of the coliseum preparing molding sand.

Recent improvements in core ovens were exemplified at the booths of manufacturers of this type of equipment. The Foundry Equipment Co., Cleveland, demonstrated brick core ovens of the rack and the drawer types, as well as a core rack. A large electrically heated oven, 19 x 19 feet, was built at the booth of Young Bros. Co., Detroit, in the coliseum. Several smaller core ovens and models of continuous conveyor ovens were on display inside of the large unit.

Show Core Ovens

The Swartwout Co., Cleveland, showed a metal insulated drawer type oven and a full section of a lift door type metal insulated oven including the lift door, the lifting mechanism and the structural frame. A rack type core baking oven with metal walls and specially insulated doors featured the display of the Marshall Blow Pipe Co., Detroit. Drawings and data on core ovens, melting furnaces and heat treating furnaces for the foundry industries were shown by Holcroft & Co., Detroit.

Several types of metal abrasives and specimen castings cleaned with these materials were shown by the Globe Steel Abrasive Co., Mansfield, O., and the American Steel & Abrasive Co., Galion, O.

Flasks of various types were exhibited by a number of manufacturers. The Truscon Steel Co., Youngstown, O., displayed steel foundry flasks, bottom boards, core plates and racks, mold jackets, snap flask bands, alloy steel platforms and material handling equipment. Rolled steel flasks, wheelbarrows and trucks were exhibited by the Sterling Wheelbarrow Co., Milwaukee.

The Diamond Clamp & Flask Co., Richmond, Ind., had snap flasks, steel bands and packets, on display,

while the H. L. Baumgardner Corp., Chicago, used a special slip flask in making molds on the convention floor.

Numerous kinds of pattern lumber were given prominence at the booths at the Sabin Machine Co., Cleveland, Dock & Mill Co., North Tonawanda, N. Y., Sugar Pine Sales Co., San Francisco, and Kindt-Collins Co., Cleveland. The latter company also exhibited a line of other pattern shop supplies.

Samples of patterns and core boxes made of copper were shown by the Electro-Chemical Pattern & Mfg. Co., Detroit. The Springfield Aluminum Plate & Castings Co., Springfield, O., featured aluminum castings and match plates.

Many types of foundry chaplets, tumbling mill stars and snap flask trimmings were shown by the Fanner Mfg. Co., Cleveland while the Combined Supply & Equipment Co., Inc., Buffalo showed chaplets, skim gates and a special machine for applying paste to cores. Foundry supplies and polishers and platers supplies were shown by E. J. Doodison Co.. Detroit. Nails for foundry use were shown by the Fowler & Union Horse Nail Co., Buffalo.

Through charts, posters and photographs, the International Correspondence Schools, Scranton, Pa., indicated its work in the foundry field.

Few machine tools were on display. Most of the machinery was confined to hand tools, many of the pneumatic type. Some patternworking equipment was exhibited but the bulk of the exhibits included metalworking machinery. The Chicago Pneumatic Tool Co., New York, displayed a line of pneumatic tools including grinders, chippers and drills.

The Crown Rheostat & Supply Co., Chicago, showed an electric-driven polishing lathe with bronze, case hardened gears. A belt-driven plating barrel, four polishing lathes and its line of emery pastes, tallow pastes and polishing compounds completed its exhibit.

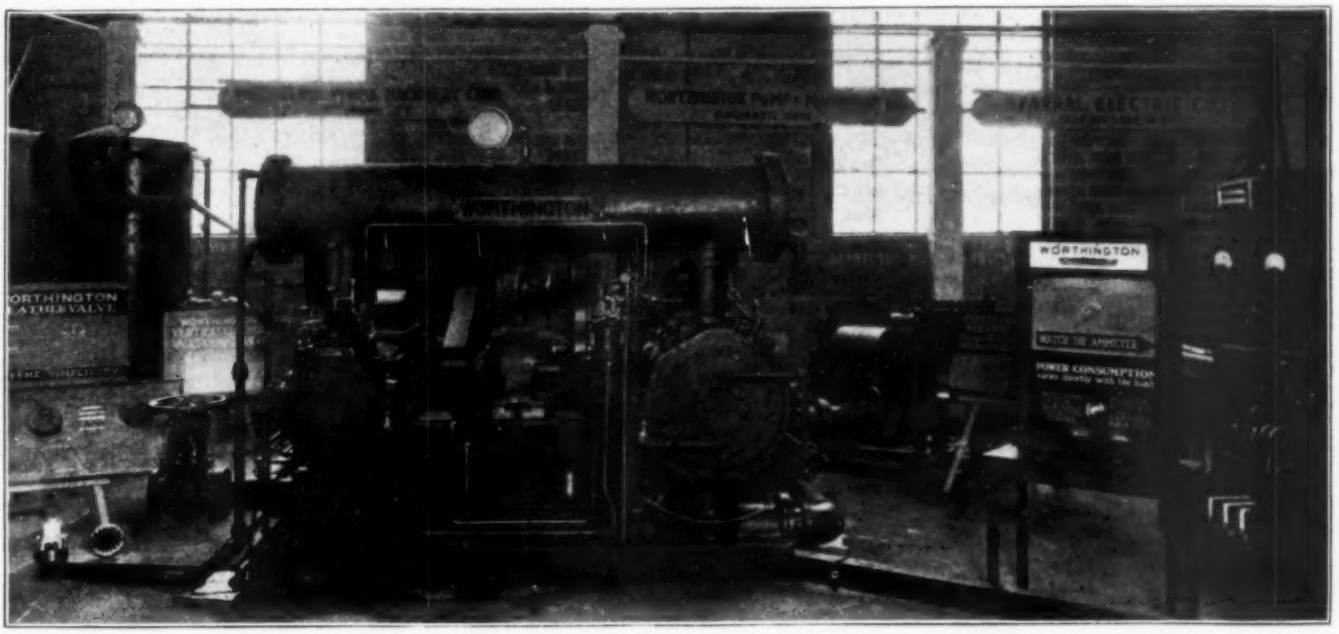
Pneumatic grinders, riveters, nut setters, sand rammers and paving breakers were displayed by the Independent Pneumatic Tool Co., Chicago. The Cleveland Pneumatic Tool Co., Cleveland, exhibited some of its line of pneumatic sand rammers, grinders, riveters, chippers, etc. Foundry pipe and hose fittings also were included in its display. William H. Keller Inc., Grand Haven, Mich., also displayed pneumatic chippers, rammers and grinders. Ingersoll-Rand Co., New York, in addition to its line of pneumatic portable tools, displayed five pneumatic hoists ranging from 1000 to 10,000 pounds capacity. A pneumatic pedestal grinder and a pneumatic motor also were included.

Operate Grinding Machines

A double end floor grinder and a swing grinder were presented by the Bridgeport Safety Emery Wheel Co., Bridgeport, Conn., and the Safety Emery Wheel Co., Springfield, O. A heavy double end grinder was displayed by the Norton Co., Worcester, Mass., which also showed a special machine for high speed operation of wheels of large diameter. It operated also a segmental grinding wheel, 40 inches in diameter, 10 inches thick and weighing 1180 pounds.

The American Electric Motors, Inc., Milwaukee, exhibited four heavy duty grinding stands and motors, one of the latter being of the self ventilating type. The Carborundum Co., Niagara Falls, N. Y., exhibited its line of grinding wheels, abrasive paper and cloth and a tilting type crucible furnace lined with special refractory cement. Dust proof ball bearing grinder heads and a heavy swing frame grinder in operation were shown by the Transmission Ball Bearing Co., Inc., Buffalo.

The Oliver Machinery Co., Grand Rapids, Mich., displayed a 22-inch capacity band saw for patternmaking. It also exhibited a large milling machine capable of handling a core box



Air Was Supplied by Five Compressor Manufacturers

37 inches in diameter. The W. A. Jones Foundry & Machine Co., Chicago, exhibited in operation a conveyor carrying castings, showing practical application of its gear speed reducers. Several other types of its speed reducers were in operation.

The Royersford Foundry & Machine Co., Inc., Royersford, Pa., displayed two drill presses, a double end, belt driven grinder and a tumbling mill. The Tesmer Machine & Tool Co., Detroit, showed two of its sprue cutters also blow valves and knee valves. A gagger, rod straightener and shear were displayed by C. E. McArthur & Co., Chicago. Wood and metal band saws were shown by Racine Tool & Machine Co., Racine, Wis.

Crane and hoist exhibits formed a large part of the material handling

equipment shown. The Hayward Co., New York, exhibited two clam shell buckets operating from two 1-ton hoists. Jervis B. Webb Co., Detroit, in conjunction with W. A. Jones Foundry & Machine Co., Chicago, demonstrated its overhead continuous trolley conveyor system and a small I-beam trolley in operation.

A 2-ton lift crane for foundry use was shown by Northern Engineering Works, Detroit. Yale & Towne Mfg. Co., Stamford, Conn., exhibited a 1-ton and a 2-ton spur geared block hoist, and a 1-ton and 2-ton electric hoist. A 1-ton screw geared block hand hoist also was shown. The Shepard Electric Crane & Hoist Co., Montour Falls, N. Y., showed a cupola charging hoist of 3-ton capacity in operation lowering charges from bottom dump buckets into a dummy cupola.

The Louden Machinery Co., Fairfield, Iowa, exhibited a 1-ton traveling crane with 34-foot span runway and its monorail system including switches, turntables, hoisting elevators, etc. Two 2-ton hoists, hand controlled and a 1-ton traveling hoist with three-phase motor were operated by the American Engineering Co., Philadelphia. That company also displayed a 3-ton hoist with covers removed to show the gearing. Chisholm-Moore Mfg. Co., Cleveland, had a 2-ton crane, two chain hoists, and a dummy cupola showing action of its charging bucket. The Sabin Machine Co., Cleveland, showed a line of steel barrels and a truck for handling this type barrel.

Display Air Compressors

The Clark Tructractor Co., Buchanan, Mich., displayed a 4000-pound capacity gasoline dump truck, a 4000-pound capacity lift truck and an electric truck. The Automatic Transportation Co., Buffalo, showed its new type of six-wheel industrial truck with equalized and compensated four wheel front axle. A 6000-pound capacity lift truck, a 3000-pound capacity electric locomotive crane, and a three-wheel tractor also were displayed.

G. H. Williams Co., Erie Pa., exhibited a ¾-cubic yard clam shell bucket and working models. Hand and power driven pulleys, the latter with a tachometer connection for showing the revolutions per minute were shown in the booth of the Reeves Pulley Co., Columbus, Ind. Trolley equipment, ranging from ½ to 4-ton capacity was displayed by Richards-Wilcox Mfg. Co., Aurora, Ill.

Numerous exhibitors had air compressors in operation. The Sullivan Machinery Co., Chicago, operated a large compressor. A new type air compressor with direct connected synchronous motor with push button control was shown in operation by the Worthington Pump & Machinery Corp., New York. The Westinghouse Traction Brake Co., Wilmerding, Pa., operated a motor driven air compressor with automatic control. A hydraulic press for straightening castings also was on display. A large turbo compressor was operated by the Spencer Turbine Co., Hartford, Conn., and the Ingersoll-Rand Co., New York, operated an electrically driven air compressor. Exhausting equipment, including two roof ventilators, were shown by Allen Air-Turbine Ventilator Co., Detroit.

Welding and cutting apparatus in operation was displayed by manufacturers of welding equipment and gases. Air Reduction Sales Co., New York, exhibited its oxygen and acetylene cylinders and had in operation a welding and cutting table. An acetylene gas generating unit for supplying gas to portable cylinders, as well as tanks and welding carts were exhibited by Oxweld Acetylene Co., New York.

Cutting apparatus, wire, rods, tanks and a welding and cutting unit in operation comprised the display of the Weldit Acetylene Co., Detroit. Agnew Electric Welder Inc., Milwaukee, had in operation a spot welder and had other welding equipment and supplies on display. Welding torches, combination cutting and welding torches, pressure regulators, and other equipment were shown by Alexander Milburn Co., Baltimore. Parts of the torches and regulators assembled on display boards also were shown.

Electric Controller & Mfg. Co., Cleveland, exhibited a line of push button controlled automatic starters for direct and alternating current motors, automatic compensators for starting squirrel cage and synchronous motors and other electrical equipment.

General Electric Co., Schenectady, N. Y., had on display a part of its line of welding equipment, motor generator sets, blowers and motors. Fairbanks, Morse & Co., Chicago, exhibited ball bearing motors, including an enclosed ventilator motor specially adapted to foundry work. A new method of grease tube lubrication was featured at the booth of that company.

Makers and sellers of cokes and coals had samples of their brands of these materials on display. Hickman, Williams & Co., Chicago, showed pig iron and coke samples. The Indiana Coke & Gas Co., Terre Haute, Ind., displayed by-product coke. Pickands, Brown & Co., Chicago, had its exhibit of foundry coke arranged in an attractive arch frame.

Rogers Brown & Crocker Bros. Inc., New York, had on exhibit some of its foundry coke and molding sand. Hammond Iron Co., Birmingham, Ala., displayed its brand of foundry coke and in addition had in several samples of the coal from which its coke is produced. Samples of its line of foundry coke composed the exhibit of the Semet-Solvay Co., Detroit. Bethlehem Steel Co., Bethlehem, Pa., exhibited numerous castings made from its special brand of pig iron. Some of the castings were fractured to show grain structure.

Several construction engineering companies, specializing in industrial building were among the exhibitors. The Austin Co., Cleveland, had in its booth drawings, photographs, blueprints and literature on foundry buildings. Frank D. Chase, Inc., Chicago, exhibited foundry engineering plans, layouts and photographs.

Blaw-Knox Co., Pittsburgh, exhibited a full size single line type bucket. An operating model of a stiff leg derrick hoisting engine was an added attraction.

Exhibits Flexible Shaft

R. G. Haskins Co., Chicago, exhibited a line of flexible shaft equipment for grinding, sanding, drilling and filling operations. Norma-Hoffman Bearings Corp., Stamford, Conn., exhibited its line of precision ball bearings, thrust ball bearings, special types of roller bearings and a precision measuring instrument. Production Equipment Co., Cleveland, exhibited a large sand cutting machine.

Falk Corp., Milwaukee, displayed flexible coupling springs, two single reduction gears, one small and one large, and an induction motor. Keystone Lubricating Co., Philadelphia, demonstrated its different lubricants for air tools and electric motors.

Smith-Monroe Co., South Bend, Ind., exhibited a unit for separating oil and gas from compressed air lines. An automatic trap release for the collected water or oil is a feature of the new product, which operates on air lines of from 2 to over 100 pounds pressure. Boyer-Campbell Co., Detroit, displayed safety appliances including goggles, helmets, shoes, leggings, etc. An exhibit of flexible shafting equipment also was displayed.

Extent to which the core binder field has been developed in recent years is indicated by the number of exhibits and by the elaborate displays staged by many of the manu-

(*Concluded on Page* 835)

Marks Influence of Elements on Cast Iron Structure-II

Gives Views Accounting for Differences in Depth of Chill Loss—Points Out That Chill Tests Will Give Some Idea of Structure Before Pouring Metal

By John Shaw

AT LEAST three views are held by various workers which might account for the difference in loss of chill between the test piece and the roll.

The assumption of Wüst and Miny that manganese has a favorable effect on the formation of graphite because, owing to the formation of MnS, sulphur is extracted from the melts before the graphite begins to form, was the view the writer held at first. That point has been dealt with in the previous section. Considering that the metal often is held in the air furnace at fairly high temperatures for quite four hours, while manganese and carbon determinations are made, to rectify the chill, it would be expected that a state of equilibrium would have been attained before the metal was tapped into the ladle, both chill test and roll being cast from the same ladles. The loss, as far as can be analyzed, does not arise from any considerable loss of sulphur between the test piece and the roll.

The second view, that the small loss in the roll with the high sulphur and low manganese is due to the stabilizing effect of the sulphur on the carbide—is sound. In this connection the excellent paper by Piwowarsky gives some illuminating examples. His cooling and other curves are to be found in Figs. 13 to 17. The 50 degrees Cent. per minute fall in temperature is supposed to represent the normal fall in thin castings, while the 10 degrees Cent. per minute is the ratio of fall in temperature when medium castings are in question. Unfortunately no actual thickness is mentioned. Figs. 14 and 15 are eutectic mixtures, while Figs. 16 and 17 represent the hypo-eutectic irons used. The four analyses for each are given at the side, the manganese in all cases being 0.26 per cent, while the phosphorus was 0.038 per cent, and the sulphur was increased as shown. The summary given of the results of 70 melts was as follows:

> In low-manganese cast irons the effect of sulphur on the formation of carbides is the more intense and discontinuous—
> (a) the lower the total carbon and silicon
> (b) the greater the rate of solidification and cooling of the casting. (Wall thickness.)
>
> It is to the producers' interest, when making low-manganese iron (below 0.3 per cent to 0.4 per cent) to aim at a sulphur content of less than 0.08 per cent to 0.1 per cent in the finished material. An increase of manganese to at least 0.7 per cent offers, however, great advantages, because even in low-silicon, low-carbon, high-quality cast iron, a sulphur content of up to 0.15 per cent must be regarded as harmless.

A point worth noting in connection with the graphs of Figs. 14 to 17 is that with manganese constant at 0.26 per cent and phosphorus at 0.038 per cent, total carbon of 3.68 per cent and silicon of 2.76 per cent neutralize the carbide forming tendency of 0.736 per cent sulphur, the combined carbon only being 0.58 per cent. Also if the silicon is lowered to 1.86 per cent, this, with carbon at 3.64 per cent, can still keep the combined carbon down to 1 per cent with sulphur at 0.296 per cent. The above two examples were cooled at 10 degrees Cent. per minute. Even when cooled five times as quickly, viz.—50 degrees Cent. per minute, it would appear that 3.68 per cent total carbon and 2.76 per cent silicon can limit the carbide forming effect of 0.496 per cent sulphur, the combined carbon being only about 0.84 per cent. From these results it would appear if we neglect any weakening effect of the FeS present, that silicon has equally the effect of neutralizing the carbide forming effect of sulphur, that is attributed to manganese. This is in line with Coe's work in 1912. He states "the influence of sulphur on the condition of the carbon varies according to the percentage of silicon present; when the silicon is low (about 1 per cent) small additions of sulphur will throw the greater part of the carbon into the combined form; when the silicon is high, the effect of the sulphur is much less marked."

To test Coe's theory, four test bars 1.2-inch diameter by 14 inches long were cast vertically in dry sand molds. These were tested, transverse, tensile and deflection being taken. The composition is given in Table V.

While the tensile tests results were fairly good, the transverse results were not equal to those of metal of lower sulphur or higher manganese containing the same combined carbon.

Table VIII shows the results of Coe's and the present experiments.

The author had two objects in making these experiments; first, confirmation of Piwowarsky's results, second, to determine what effect the large sulphur content of these bars had on the physical properties of the iron. Coe's results would point to little loss of strength or deflection even when the sulphur was ten times the atomic ratio of sulphur to manganese (S 0.18 per cent, Mn. 0.03 per cent). Unfortunately owing to the recent coal dispute it was not possible for us to make more than three sets of bars, one set of which *K* (B) Table VIII was useless because the ratio of manganese to sulphur was too high (S 0.197 per cent—Mn 0.55 per cent). The *K* bars results lend some strength to Coe's contention, but the results of *D* bars do not. The whole results of the *D* bars are so irregular (a combined carbon of 1.05 per cent, yet with a scleroscope hardness of 34 and long flaky graphite) that the experiment

Finds Chill Test Useful

In this second and last section of his paper read at the thirtieth annual convention of the American Foundrymen's association and second International Foundrymen's congress held at Detroit Sept. 27 to Oct. 1, Mr. Shaw presents three views held by various investigators to account for the loss in chill between the roll and the test piece. The effect of manganese on chill is discussed and mention made of the effect of the ratio of carbon to silicon on the structure. Mr. Shaw also points out that chill test bars are useful in determining the structure of the metal before casting in ordinary gray iron practice.

Table V

Analysis of Bars

	Two bars K per cent	Two bars D per cent
Total carbon	3.36	3.52
Combined carbon	0.98	1.05
Silicon	3.04	2.80
Manganese	0.55	0.35
Sulphur	0.34	0.285
Phosphorus	0.038	0.35

must be carried out a number of times before any conclusions can be drawn.

It was thought it would add to the interest if photomicrographs of the cross section of these bars were added. These photomicrographs are given as Figs. 18 to 30 inclusive. In all five sets of samples were sent out, and in no case was FeS identified as a separate identity. This is in accordance with Hurst's interpretation that FeS in the quantities present in cast iron cannot be identified separately because it exists in solid solution in the iron. It is probable that an eutectoid containing FeS exists but in high carbon alloys such as cast iron this eutectoid has never been identified and would be extremely difficult to identify if it did exist. The question of the formation of MnS in these bars deserves your consideration. The base of the material was a hematite with 0.07 per cent S. In Mr. Dickinson's case a pot furnace was used and the highest temperature attained was 1300 degrees Cent., yet these are large areas where so-called MnS is in evidence. Two theories are advanced to cover this point; first, that chemical reactions take place independently of temperature or melting point, of which case hardening is an example, and second, that the areas of supposed MnS are mixed sulphides with much lower melting points than the 1620 degrees Cent. of MnS.

With these photomicrographs are included the actual findings of J. E. Fletcher and Glen Primrose.

This brings us to the third view regarding the cause of loss of chill between the test and the roll, viz.—that manganese, under certain conditions acts as a softener, not only by its action on the sulphur, but by its direct graphitizing effect on the carbon.

It may be taken for granted that silicon and manganese are similar in their neutralizing of the carbide forming effect of sulphur. Both are hardeners of cast iron by their direct action, and both elements have a softening effect on cast iron due to their indirect action on the carbon.

Outerbridge, Jr., suggests that the softening effect of manganese is lost when high carbon, high silicon (with its low sulphur) are present in the material. He states it often leads to hard spots. Coe is in agreement with this idea, "It appears that a quantiity of manganese as low as 0.18 per cent with no sulphur present is able to produce a great change in the composition of the iron; more than about 0.5 per cent manganese tends to retain more carbon in the combined form." Now all these statements, while true for the conditions worked under, do not hold good for different conditions. For instance, earlier in the same paper Coe states when using hematite iron from Blaeuavon and casting ¾-inch square bars from it, "It will be seen from the analyses that the addition of 2 per cent manganese to such an iron produces an inappreciable chemical effect, in fact, it appears that with 2.65 per cent manganese there is a softening action owing to a decreased percentage of combined carbon." Low carbon, low silicon, and high sulphur would all demand higher manganese to obtain the same softening effect on irons of contrary composition. This factor may perhaps reconcile some of the divergent views held on this question.

What proofs can be offered? Outerbridge, Jr., in a paper before this association, in 1911 found that the addition of roughly 0.14 per cent manganese to a ladle of metal reduced the chill. The combined carbon was reduced to about one-half of that in the receiving ladle. "Manganese," he mentioned. "is commonly supposed to exert a hardening effect on cast iron,

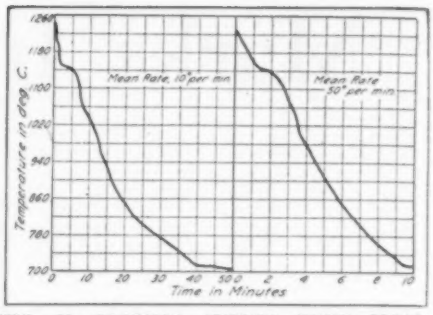


FIG. 13—COOLING CURVES WITH MEAN COOLING SPEEDS

but experience has taught me to regard this as another mistaken notion." The reaction mentioned above is regarded in some quarters as due to deoxidation, but when you remember that the car wheel specification calls for a manganese content of not less than 3 to 1 of sulphur in the finished product, it would be thought there was enough surplus manganese present to do all deoxidation needed in the cupola or at least in the large receiving ladle, long before this small addition of manganese was made in the 600 pound ladle. If you will consider this as an addition of softening material the result is clear at once.

Oxidation Taken Care of

Coe's experiments were conducted under laboratory conditions, so oxidation would be taken care of. As in his gray iron material sulphur was below 0.03 per cent and below 0.01 per cent in his phosphoric iron, the question of the effect on the sulphur would not enter into the results to any extent. Two of his results have been quoted. During the preparation of a paper on "Silicon in Cast Iron" by Hague and Turner, the authors found that an arrest point, previously noted in a prior investigation, had disappeared while using their present iron. The only difference approximately being an 0.5 per cent manganese, it was resolved to make this addition and try the result out. It was found this reduced the combined carbon from 0.84 per cent to 0.22 per cent. The two analyses were those given in Table VI.

In Turner's words "It was seen

Table VI

Effect of Manganese on Carbon

	Original metal per cent	Plus 0.5 per cent Mn per cent
Total carbon	2.77	2.62
Graphitic carbon	1.93	2.40
Combined carbon	0.84	0.22
Silicon	3.06	3.00
Manganese	Nil	0.5
Sulphur	Trace	Trace
Phosphorus	Trace	Trace

Table VII

Comparison of Roll Analyses

	No. 1	No. 2
Total carbon, per cent	3.01	3.167
Combined carbon, per cent	0.81	1.32
Silicon, per cent	0.62	0.79
Manganese, per cent	0.426	0.381
Sulphur, per cent	0.128	0.162
Ratio	3.3 Mn to 1 S	2.09 Mn to 1 S

that there is a considerable expansion corresponding to the arrest point A_3 while the temperature of this arrest is lowered from 764 degrees Cent. to 687 degrees Cent." Hague suggests a possible explanation of this expansion, that "it is caused by the separation of a second quantity of graphite, that from the saturated martensite. In view of the fact that the sulphur is only a trace, it is interesting to record this direct stable graphitizing forming tendency of the manganese." He also states that "it is only in conjunction with silicon that manganese has this influence."

The writer was interested in this subject by noting the combined carbon content in certain rolls not widely varying in analysis, and also to the fact that a combined carbon content round the pearlitic point gave a better wearing surface. If you will turn back to the experiment carried out with the 12-inch square blocks you will find the analyses of two rolls that are fairly divergent. In so doing differences are most easily seen. The composition of roll No. 2 was aimed at because a hard face was of more importance than strength. Please note the combined carbon content and account for its difference by any other reason than the ratio of manganese to sulphur. There is little doubt that the excess manganese over that necessary to counteract the influence of the sulphur present. Whether this is in the form of MnS or $Fe_2Mn_2S_3$, or simply a mixed sulphide, is of no concern for the time. With total carbon 2.96 per cent, silicon 0. 5 per cent, a combined carbon of 0.5 per cent is obtained; yet with the higher total carbon of 3.16 per cent and silicon of 0.83 per cent, the combined carbon is 1.37 per cent. Take twenty rolls haphazard whose composition is much nearer, ten with combined carbon below 1 per cent and ten with combined carbon over 1 per cent, the average of the first ten worked out as in the first column and the second ten averaged as column No. 2 in Table VII.

Table VIII

Comparison of Test Results of Coe and Shaw

	Coe	Coe	Coe	K (A)	K (B)	D
Total carbon, per cent	2.94	2.70	2.90	3.36	.....	3.52
Graphitic carbon, per cent	1.84	1.57	1.57	2.38	.....	2.47
Combined carbon, per cent	1.06	1.13	1.33	0.98	0.35	1.05
Silicon, per cent	2.24	2.37	1.23	3.04	.....	2.80
Sulphur, per cent	0.104	0.180	0.204	0.34	0.197	0.285
Manganese, per cent	0.03	0.03	0.325	0.55	0.55	0.35
Phosphorus, per cent	0.01	0.01	0.01	0.038	0.035	0.038
Transverse strength of 12 × 1 × 1 inch bar in pounds	3,326	3,998	3,057	2,867	4,301	1,702
Deflection, in inches	0.114	0.150	0.097	0.18	0.20	0.12
Tensile strength, pounds per square inch	29,210	34,272	28,246	25,760	35,840	20,428
Shore scleroscope, hardness number	45	43	53	42	.....	34

These results can be duplicated by reference to the laboratory books. They are left for your criticism and comment. That the results justify the contention, the two photomicrographs in Figs. 31 and 32, taken from the center of a 33-inch diameter roll weighing 9 tons will show.

Effect of the Carbon-Silicon Ratio

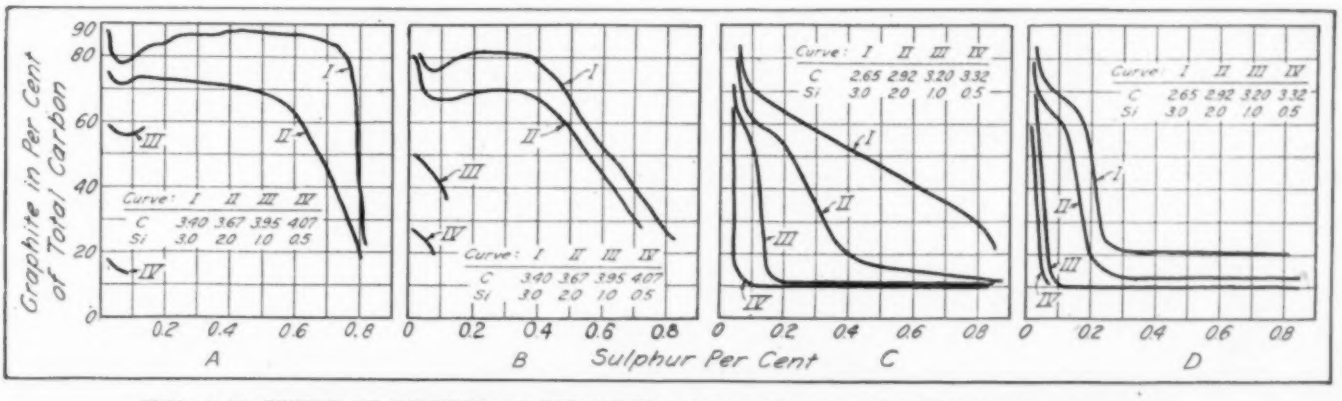
The effect of the ratio of carbon to silicon on structure as judged by the chill test is to be considered. The influence of both silicon and carbon has been investigated so fully by Turner, Wüst, Gontermann and others, that their effect is well known. What is to be deprecated is the attempt made to apply their conclusions, without due attention to the equally dominating factors of moderate amounts of manganese, sulphur and phosphorus in cast iron.

Use is constantly being made of considering complex cast iron simply as a certain percentage carbon steel interspersed with free graphite, and can lead only to wrong conclusions. It is not proposed to discuss this question, but to point out another factor that calls for consideration, that of the grouping together of the total carbon plus silicon content as contained in some papers. From it the ordinary man would judge that if total carbon +silicon=5, a similar structure would be obtained if your mixture (other constituents being equal) was either total carbon 4 per cent+silicon 1 per cent or total carbon 1 per cent+ silicon 4 per cent. We have found, to our cost, that this is not so, and it is not till you are tied down to the fine limits imposed by chill that you appreciate it.

Thrasher, in a malleable paper published in THE FOUNDRY December 1915, put forward the following ratio —that "four points of carbon are equal in effect to three points of silicon, when the silicon in the mixture is over 0.7 per cent; and that below this silicon content, two points of carbon are equivalent to one point of silicon in their effect on the structure of the iron" (Fig. 33). Experience over several years supports these figures, and further confirmation will be found in referring to Fig. 5 of Lowry's paper before this association in 1924. Taking the curve of the ½-inch chill, the lower end shows 3.67 per cent total carbon+0.4 per cent silicon, the upper end 3.04 per cent total carbon+0.75 per cent silicon, the difference being as 35 is to 63, or about twice. The ¼-inch chill curve with its higher silicon works out at 51 to 68, or nearly again Thrasher's figure of four points carbon equivalent to three points silicon.

It may be thought that a chill test, while needful for chilled work, does not find a place in ordinary gray iron practice. For a number of years we

(*Continued on Page* 828)



FIGS. 14-17—EFFECT OF SULPHUR ON FORMATION OF CARBIDE IN LOW-MANGANESE CAST IRON

FIG. 18

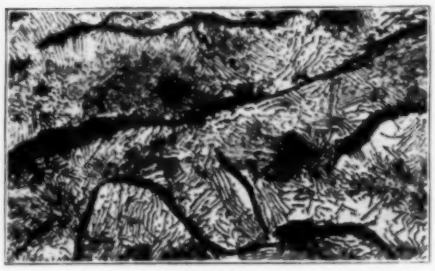


FIG. 24

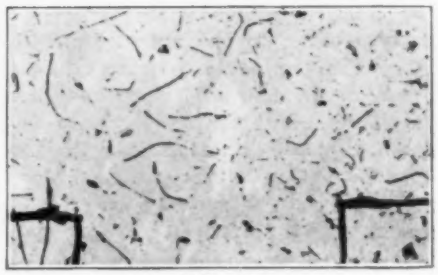


FIG. 26

FIG. 19

FIG. 20

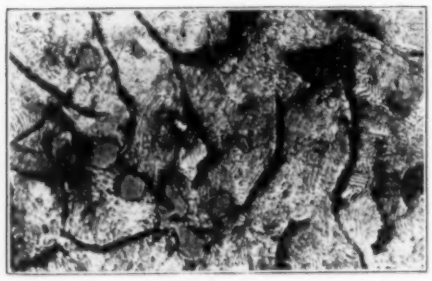


FIG. 21

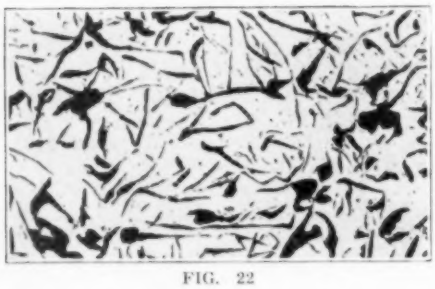


FIG. 22

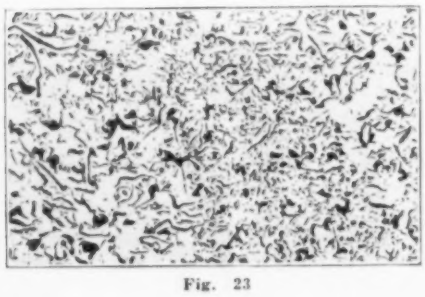


Fig. 23

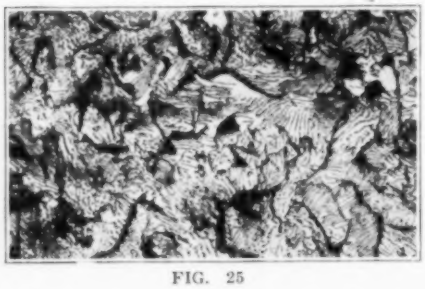


FIG. 25

Discussion of Micrographs

By J. E. Fletcher and Glen Primrose

Discussion by J. E. Fletcher of Photomicrographs of Bars K and D, Figs. 18 to 25

The structures are quite typical of the two metals when cast under such conditions as would yield pearlite throughout the bar sections. The size of the graphite flakes and of the pearlite grains varies across the bar section in each case, the smaller grains being, of course, associated with more rapid cooling. Part of the metal making first contact with the mold surface and thereby cooled has obviously been swept into the interior portions of the section and has cooled there, thus causing the lack of uniformity seen in the unetched photomicrographs of Figs. 19 and 23. The metal in bars K was almost eutectic and has yielded nearly perfect pearlite, very little free ferrite being seen.

The presence of the sulphides is clearly responsible for this fact, the pearlite being intermingled with free cementite in local areas. The higher sulphur content in bars K is seen in the etched photomicrographs of Figs. 24 and 25 (200 diameters) when compared with photomicrographs of Figs. 20 and 21 (bars D). The sulphide in the K bars is in larger individual areas of typical MnS shape than in bars D.

It would be expected—according to generally accepted ideas—that FeS areas in the photomicrographs would appear. There is some evidence that free FeS is present in both metals, the golden or bronze tinted crystals being found surrounding or sandwiched in between the dove colored MnS areas. But this phenomenon was only observed in a few localities throughout the entire polished area and, unless the FeS is distributed in colloidal precipitations more generally, there is insufficient evidence to prove that FeS commonly exists as free crystals in cast irons of the D analysis.

The writer observed the golden tinted globules in specimens from the chill block 2 where the Mn content is 0.27 per cent and the S content 0.164 (Mn/S ratio 1.65) and in the metal bar D where the Mn content is 0.35 per cent and the S content 0.285 (Mn/S ratio 1.23). Only traces could be seen in the chill block 1 and bar K. If these bronze tinted globules are FeS then the same constituent, which has been observed in white fractured hematite iron (Mn 0.15 per cent S 0.35 per cent for example) as used for white heart malleable castings would appear to favor the theory that when there is insufficient Mn to meet MnS needs the remainder of the S is present in the form of FeS. But there is always the possibility that the two sulphides may be present in a compound form or as a eutectic. We have no certain information that such compounds or mixtures of the two sulphides show the golden tint observed in malleable casting structures and in the chill block 2 and bar D.

The combined carbon contents in the two bars K and D are in excess of true pearlite requirements and, were the sulphur content lower, the combined carbon content in normally cast metal would be generally below 0.7 per cent (with S below 0.10 per cent). Hence the conclusion that sulphur in the region of 0.3 per cent has been responsible for the high combined carbon content in the bars K and D.

Discussion by Glen Primrose regarding Bars D and K, Figs. 26 to 30

Fig. 26, 27, 28—D Bar: The main thing to note is the great separation of graphite in Fig. 26. This is near the core and shows the effect of the inverse chill due to sulphur. The other two photomicrographs show the big graphite patches near the top and the small graphite lower down.

K Bar: There is a much more uniform distribution of graphite for size of flake and the unetched photomicrograph (Fig. 29) at 100 diameters indicates the small size of this, also the very striking nest of sulphides present. There are many patches we could see at about 100 diameters where no sulphide shows at all. The arrow head is clearly shown in this print and it is seen how the sulphides have globularized. This is typical of MnS and there is no trace of FeS that we could see anywhere in a long search. These were etched with picric acid, so as to make the biggest difference possible between MnS and FeS if any.

(*Continued from Page* 827)

have used nothing else, except a direct impact test. While we cast test bars for our customers every week, there are none cast for ourselves to check this work, yet we have only had two failures during the past two years, and both these would pass the American Foundrymen's association specification. We quite appreciate the value of test bars, but unfortunately their results are not known till after your mold is cast. By using the chill test we have a good idea of the ultimate structure of our metal before casting. For instance we know, that quite irrespective of composition, if the

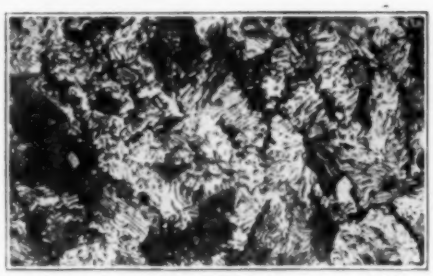


FIG. 27

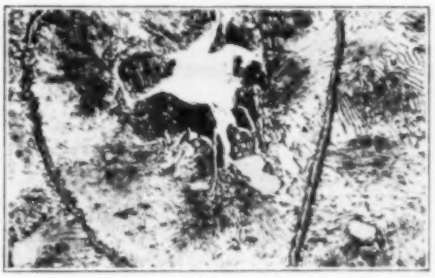


FIG. 28

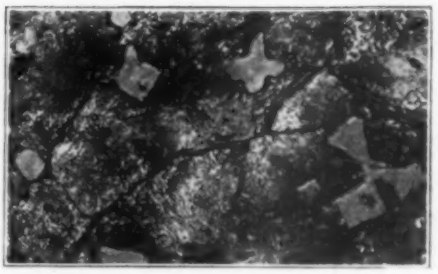


FIG. 30

chill test shows ⅛-inch to ¼-inch on the 1¼-inch chill test, castings ¾-inch to 1-inch thick will machine readily, and the 1.2-inch diameter bar will easily pass the specification and yield at least 10 tons per square inch tensile. For castings averaging 1½-inch thick a test of ½-inch to ¾-inch deep is required, and for cylinders 3-inch thick a chill test of 1½-inch to 1¾-inch is required. When you are asked for the higher tests, say 14 to 18 tons tensile, composition is vital and demands low carbon, silicon and phosphorus.

In the case of silicon 2 per cent and over, the 1¼-inch thick test is useless, the depth of chill being only ⅛-inch or less in all cases, so a wedge test was used. This consists of a complete chill with a taper slot 6 inches long by 1 inch at the top, to ¼-inch wide at the bottom, the depth being 2¾ inches. A sketch of this is given in Fig. 34B. To use it the chill is slightly warmed, and when your ladle is nearly full a test is cast from a pot ladle dipped into the metal. At the end of one minute the chill is turned over, the test drops out, and it is dipped into water and broken. The depth of chill is registered from the ¼-inch end. Data from this source correlated to the machining speeds in the machine shop, soon can be built up.

Will Give Useful Information

This information can be used if ever there is doubt about the metal before the castings are run. A third test in daily use was given to the author by the courtesy of the technical director of the Deutz Gas Engine Co., Cologne. It consists of a combination chill and segregation test. The test bar is divided into three pieces as shown by the notches, and a chill is placed from one end of the middle as shown in the sketch, Fig. 34A. Besides giving the depth of chill and therefore some idea of the ultimate structure, by its quicker cooling, any sign of segregation is shown in the more slowly cooled half. This test is cast from the main ladle, left to cool till morning, and broken in three pieces through the notches. The center piece is then taken into the foundry manager's office, and he can see at a glance from the depth of chill if the hardness of the metal is suitable for the job, and also if there is any tendency for segregation, which would show up at the gray end.

Piston Rings Are Porous

Question: Many of our piston rings made from a pattern 12 inches diameter 10 inches long and ¾-inch thick reveal blow holes and dirty spots when the casting is turned down to form rings ½ x ½-inch. We are using seacoal facing, 1 to 9, on these castings and wonder if this is responsible for the trouble.

Answer: The blowholes and dirty spots on the rings are caused by the bubbling action of the iron as it rises between the inside and outside walls of the mold. Your sand is too damp or is rammed too hard. Work the sand just as dry as it can be handled, ram it just sufficiently hard to hold its shape and vent the mold freely with a wire both inside and outside the ring. If you are making more than one casting in a flask you will invite further trouble unless you allow a space of at least 3 inches between adjacent patterns. The sand in this space also must be vented profusely with the wire. The use of seacoal facing is optional on piston ring castings. It is used merely to secure a clean skin and has no effect either in promoting or preventing blow holes

Gordon I. Lindsay, president, Robeson Process Co., and the American Gum Products Co., New York, sailed for England on Sept. 18 on a six-weeks business trip.

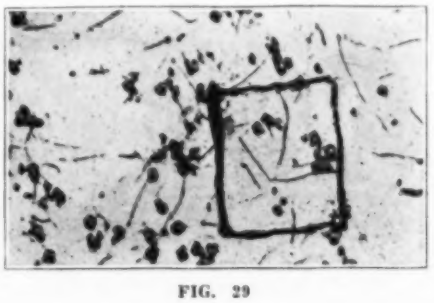


FIG. 29

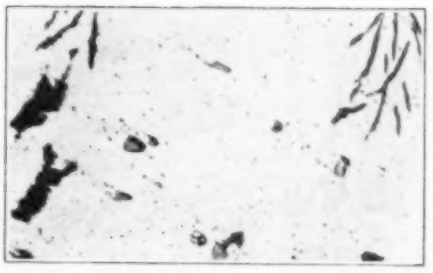


FIG. 31—FROM CENTER OF 33-INCH ROLL WEIGHING 9 TONS. SHOWS TWO TYPES OF GRAPHITE—UNETCHED—50 DIAMETERS (PRIMROSE)

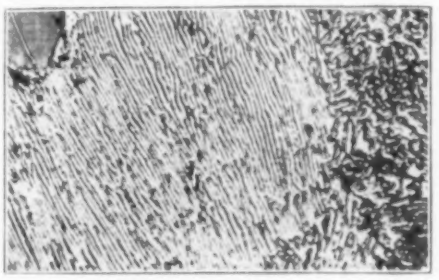


FIG. 32—FROM CENTER OF 33-INCH ROLL WEIGHING 9 TONS. SHOWS VARIOUSLY ORIENTED PEARLITE AND SULPHIDE—ETCHED 500 DIAMETERS (PRIMROSE)

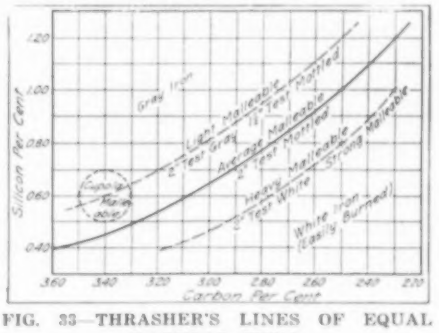


FIG. 33—THRASHER'S LINES OF EQUAL NATURAL CHILL

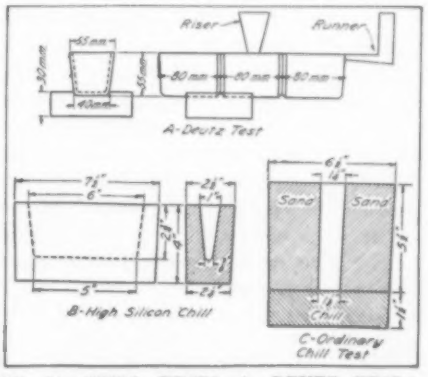


FIG. 34—CHILL TESTS—A, DEUTZ TEST—B, HIGH SILICON CHILL TEST—C, ORDINARY CHILL TEST

Bill Spreads Himself *on* Shrinkage Argument

By Pat Dwyer

ON THE second day after the convention opened in Detroit I arose betimes in the morning, as is my wont, sometimes, and sallied forth to take the air and enjoy a quiet draft of the pipe. In the quaint language of the man in the street I never fail to get a kick from watching the hurrying crowds dashing in every direction on their way presumably to work while I am free to loiter along with the element of time completely eliminated and with never a care in the world to wrinkle the placid brow, add a dash of silver to the raven tresses and all that jolly old kind of bunk so dear to the hearts of the authors of our best sellers past, present and future.

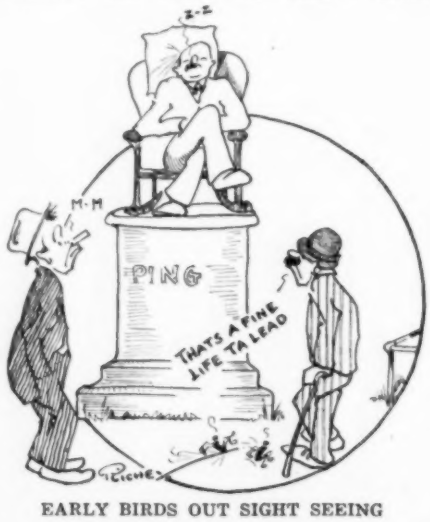
My original intention was to descend to the lobby of the hotel, procure the materials for a smoke and then sit in state in one of the deeply upholstered chairs and nonchalantly flick ashes into one of the sand filled and highly ornamented jardinieres as if I was accustomed to that mode of existence.

When I inquired for a paper of my favorite tobacco the haughty attendant replied languidly that he never had heard of it. Also after the manner of many of his tribe and generation he managed to convey the impression that I was a worm and therefore of no further interest. In a hasty endeavor to save the situation and impress him with the fact that I was a guest in good standing I told him he might give me a hand-full of stogies. He cocked the high hat a little higher and said he never had heard of them either.

Some time when I become rich enough to do as I please, to ignore all the laws duly made and provided for the protection of the individual, I intend to make a tour of all the hotels. So far as my strength will permit, backed by the best of good intentions, I will leave a souvenir with these lads that will serve as legal tender for admission to any hospital in the city. Any monies levied or assessed afterward in the way of fines will be set down cheerfully on the credit side of the ledger as sums well spent in a just cause.

Later in the day I related the incident to the lady to whom I tell everything—Oh! well then, nearly everything. There are limits, reasonable limits in what one justifiably may expect in the way of co-operation. For example I did not expect that she would offer to accompany me on the proposed tour and hold my coat, but I did expect sympathy and a reasonable show of indignation at the manner in which I had been shoved out of the picture.

She favored me with neither one nor the other. She claimed that people looking for trouble always received scripture measure, full and running over. To prove her contention she pointed out to me that she had received nothing but cordial and courteous treatment in her dealings with members of the hotel staff. As a clincher she asked me what I could expect by exhibiting my low and vulgar taste in tobacco. As Bill has remarked on many occasions, women are queer birds. You never can tell which way they are going to hop.



EARLY BIRDS OUT SIGHT SEEING

However, to resume the thread of our narrative, I had to go out into the busy marts of trade to find a place where tobacco was retailed to the common people. I anticipated no trouble in finding such a place for as Lincoln remarked on one occasion: "The Lord certainly must love the common people. See how many of them he made!"

Apparently Detroit has its share. Within a stone throw of the hotel I found one of the familiar red front stores where a nice, civil young fellow tossed me a *good morning* and a paper of the kind of tobacco I wanted. He was a rare lad with red hair and a friendly grin. When and if I start on my tour of extermination I shall invite him to accompany me. I think he would enjoy the experience and I am sure he would consider it a pleasure to help me should I unfortunately bite off more than I could chew. In fact I have his word that he would be pleased to start any time. "Leave it to me kid" he remarked cheerfully when I was going out—"Just say the word any time."

Down at one corner of Grand Circus park I ran into Bill gazing at the bronze figure of Hazen S. Pingree one time mayor of the city and later governor of the sovereign state of Michigan. I don't think Bill ever had enjoyed the pleasure of the late mayor's personal acquaintance, but he had worked in Detroit for a time at the peak of his period of popularity. He always was and still is one of Pingree's most enthusiastic admirers. Bill has no half way likes and dislikes. If he takes to a man he will stand by him right or wrong through thick and thin. If he does not like a man the best he will offer is the back of his hand or the toe of his big long boot for choice.

"There was a real guy," said Bill. "He took hold of Detroit when it was a sink of iniquity. Sodom and Gomor-

rah were quiet and peaceful pastoral villages of the plain compared to this town when Pingree was elected mayor. Driving the money changers out of the temple was only child's play compared to the manner in which he belted the big corporate interests who held the city in their grip and who relentlessly were squeezing it to their own aggrandizement.

"He flourished at a period when nearly every big American city, and for that matter many smaller ones—the ways of iniquity are contagious—were afflicted under what was known for want of a better name as Boss rule. This straight forward, hard-headed and courageous Yankee held to the somewhat singular view—singular at the time—that if any bossing was to be done the duly elected mayor was the man to do it.

"What is more to the point he did just that little thing. For four successive terms when he was elected by overwhelming majorities as mayor of the city and for the two following terms when he was elected by similar majorities as governor of Michigan he was the Big Boss. Not a boss in the—at that time—generally accepted sense of the term, but a real leader with the public interests of Detroit and its citizens for his guiding star.

"During his period of office he converted Detroit from a big, straggling, overgrown town with dirty and unpaved streets into one of the most beautiful cities in America. Millions of dollars that formerly had been diverted through crooked manipulation were collected into the city treasury and spent on legitimate advancement. He built the Grand Boulevard, beautified and extended Belle Isle and paved the streets.

"Don't think for a minute that he had an easy time. Powerful lobbies tried to balk him at every turn. They tried bullying, cajolory, flattery and bribery. On one occasion he was offered $100,000 and the governership of Michigan to withdraw his opposition to a certain measure. He turned the offer down as flat as a pancake and as you might say man to man he held to his course in spite of hell and high water.

"He trimmed the hide off the big shipping interests, the railroads, the street railroad company and the private companies who held a monopoly to furnish gas and electric current. He found that the railroads and steamboat companies cleverly were evading the payment of taxes. The street railroad people were charging exorbitant rates and refused to extend their lines. Gas and electric current were sold at nearly three times the rate prevailing in neighboring cities like Cleveland and Toledo. The water supply was in the hands of a private company. The service was poor and the rates were high.

THE ORATOR GETS AN EAR FULL

"He battled them all to a *fare-ye well* and beat them on every count. Before he got through, Detroit owned its own gas, water and light plants and the citizens enjoyed these necessities at reasonable rates. The street car service was the best and the fares the lowest in the country.

"Have you ever heard of Pingree's potato patches? There was a little stunt he pulled off that carried his name from one end of the country to the other. When the panic hit Detroit in '93, thousands of men were thrown out of work. The municipal funds provided for poor relief soon were exhausted and the sums collected and distributed by semi-public and private organizations, although stretched to the utmost, could not begin to meet the universal demand. The town was filled with lean and hungry men and their families were forced to try the extremely unpleasant experiment of existing without either food or clothing. Hard times my lad and you can lay to that.

"According to the stereotyped phrase you could not buy a job in the town. Personally I never could see any sense in that saying. Any man in a position to buy a job does not need a job. What he needs is a guardian. Look at the proposition in a sensible light. A job simply is a means to get some money. If a man has the money, what the—well, what does he want with a job?

"However, as I was saying no jobs were available and an exceedingly large number of people felt the bitter pinch of poverty. They were no lilies of the field, consider how they grow. They toil not neither do they spin and yet Solomon in all his glory was not arrayed as one of these. The unfortunate unemployed in Detroit were not arrayed like Solomon. Some of them were arrayed in the worn and cast offs of other days and some of them hid their nakedness in old cement bags and gunny sacks. The garbage collectors found their burdens light in those days.

"Pingree organized a relief bureau and worked night and day to alleviate the situation. He gave largely of his private means and even sold his favorite riding horse to help swell the fund and perhaps to serve as an example. His efforts were nullified to a certain extent by the antagonism his early crusading efforts had aroused among the moneyed interests of the city. Even the churches failed to rally to his support. He sent a request to every church in the city to appeal for funds on a certain Sunday and the total amount collected and turned in amounted to the magnificent sum of $13.80.

"Then he developed his famous potato patch idea. 'Back to the farm' says brave Hazen S. 'Thousands of vacant lots are standing idle all over the city. Thousands of men are standing idle on every street. I'll supply the seed if you birds will stick them in the ground and look after them.'

"The people jumped at the chance. Every available foot of ground in the city was dug up and planted full of potatoes. The inhabitants rooted and grubbed and hoed from morning until night. They gave an exhibition of the most intensive farming ever carried on in the state of Michigan. They gathered a bumper crop at the close of the year and then with improved business conditions they pushed the wolf away from the door throughout the winter. Some of them never went back to the shops. Their amateur experience roused the dormant agrarian instinct and they turned permanently to life in the great open spaces."

"Yes sir," said Bill, "Pingree was the original six cylinder kid and he was hitting on all six all the time. I often wonder how far he would have gone if unfortunately he had not been cut off in his prime. He contracted some kind of a mysterious disease while on a commercial mission to South Africa and while hurrying home he died in London, June 18, 1901. His funeral was the greatest demonstration ever staged in Detroit. There he sits now, gazing over the city as calm, serene and impassive as if he never had been the king pin, the boiling vortex in the stormiest period of Detroit's history. A sincere, honest, fearless chief executive of a big city who took his responsibilities seriously and who believed that his fellow citizens were entitled to a square deal. A man's man."

After a farewell look at the statue Bill and I boarded a car for the fairgrounds and on the way out Bill told me of a curious argument submitted to him for settlement a few days previously. A lad whom he called *A* showed him a sketch of a double flanged ring casting 54 inches inside diameter and 6 feet in length. *A* claimed that the dimensions on the pattern should be measured with a standard shrink rule, but that the dimensions on the corebox should be measured with an ordinary rule. *B* contended that the dimensions on both pattern and corebox should be measured with the shrink rule. Bill had replied substantially as follows:

"*B* is right in his contention that both pattern and corebox should be constructed according to shrink rule measurement. The sketch shows a metal thickness of 1½-inches in the wall of the casting. If *A's* idea was carried out he would have a core 54 inches diameter and a pattern a little over 57½ inches. The wall of the resulting casting would present a metal thickness of approximately 1¾ inches irrespective of whether the casting as a whole contracted normally or not.

"*A* probably is basing his opinion on the fact that under certain conditions the casting does not shrink to any appreciable extent in diameter and therefore if the core is made to the actual diameter required, the casting will approximate the same size. However, where these conditions obtain, it also becomes necessary to measure the pattern with the same measuring unit. The foregoing conditions represent abnormal practice where the mold or the core or both are built so rigid that they do not yield to the normal contraction of the metal. The mold for the casting shown may be made according to any one of the following 21 methods and, with the exception of one or two, the contraction will reach normal limits. Even with the exceptional cases, normal contraction will take place if the mold is stripped or eased intelligently after the casting has set.

"1. Outside of the mold is swept vertically in loam and removed while inside is swept on same foundation plate.

"2. Outside of the mold is swept on plate and allowed to remain. Inside is swept on another plate, dried and afterward lowered into suitable print.

"3 to 8. Mold is swept in sand which may be either green, dry, or skin dried. Mold may be made either in the floor or in a flask. If made in the floor the core is swept first and lifted out. If made in a flask the cheek is swept first and lifted out of the way while the core is being prepared.

OH! NO MY DEAR. THEY ARE POTATO BUGS; NOT GOLF BUGS

"9 to 16. Mold may be made either in the floor or in a flask in green sand, dry sand or skin dried sand by utilizing a comparatively shallow ring pattern which is drawn successively after each ramming until the desired height is reached. The flanges are formed by flange cores or by suitable segments cut on the band saw. If made in the floor the inside is lifted out on a circular plate. If made in a flask the cheek is lifted off.

"17. The mold may be made horizontally from a skeleton pattern which serves for both pattern and corebox. A heavy cast iron arbor fitting in the lower half of the pattern supports the entire core. If this arbor is *full* the casting will be distorted out of round. The diameter horizontally as the casting lies in the sand will be greater than the vertical diameter. This is caused by contraction.

"18 and 19. The casting may be made horizontally from a full pattern and a half core box. The core may be either green or dry sand or a combination of both, that is a dry sand bottom half and a green sand top.

"20. The mold may be made horizontally from a full pattern and the core may be swept in loam on a suitable core barrel."

"Well," I said, "that is a pretty comprehensive explanation. Did it settle the argument?"

"I don't know," said Bill. "Sometimes I find myself in the position of the public speaker who complained to the chairman that on account of the noise and confusion he could hardly hear himself. Imagine his feelings when a rude person at the back of the hall yelled: 'Cheer up gov'nor, you ain't missin' much!'"

Steel Castings Shrink

Question: We are forwarding sketches of three castings and indicating the position of blowholes on the cope side. We are positive the steel is not responsible. It is thoroughly deoxidized before it is poured. We are wondering if the sand is responsible due to being too closely grained.

Answer: Basing our opinion on the evidence submitted we are inclined to the belief that small sink heads are the principal cause of your trouble. Without question a small sink head is responsible for the shrink hole in the hub of the wheel in sketch No. 1. Instead of 2½ inches, the riser should be the full size of the hub 3¾ inches and then flared to approximately 6 inches diameter. The same is true of the flange, sketch 3, where the riser is only 3½ inches high. This riser should be at least 4 x 6 inches and 8 inches high.

Small risers on steel castings are worse than none. They are of absolutely no benefit and they involve expense in their removal. You are quite correct in your belief that a close grade of sand will cause blowholes in a casting and it may be a contributary cause in this instance, but if you place larger heads on your castings most of your present troubles will disappear because better feeding will result with less tendency to shrink holes.

Foundrymen Will Meet

Quad City Foundrymen's association will hold a dinner meeting on Oct. 18 at the Fort Armstrong hotel, Rock Island, Ill. Reports will be made by members who attended the recent American Foundrymen's convention at Detroit.

Payment will be made for all contributions on foundry and pattern shop practice suitable for publication

CARE AND MAINTENANCE OF WIRE ROPE

HOW TO SEIZE WIRE ROPE

Ends of an ordinary wire rope should have at least three seizings to prevent unlaying, which, if it occurs, would render the rope useless. The seizings may be replaced by fittings if they are designed to prevent unlaying of the rope.

A—Wind the seizing wire on the rope by hand, keeping the coil together and considerable tension on the wire, winding over from left to right as in A of Fig. 2.

B—Twist the ends of the wire together counter-clockwise by hand so that the twisted portion of the wires is near the middle of the seizing.

C—Using carew cutters, tighten the twist just enough to take up the slack. Do not try to tighten the seizing by twisting.

D—Tighten the seizing by prying the twist away from the axis of the rope with the cutters.

E—Tighten the twist again as in *C*. Repeat *D* and *E* as often as is necessary to make the seizing tight and rigid. Cut off the ends of the wires, and pound the twist flat against the rope.

The appearance of the finished seizing is shown in *F*.

Any annealed low carbon steel wire may be used for seizings, the size ranging from No. 10 to No. 18, depending upon the diameter of the rope. This method is taken from the United States government master specifications No. 297.

(*Concluded on Data Sheet No.* 642)

Note—This sheet may be cut into two sections, 5 x 7 inches, and may be readily bound in note book form.

CARE AND MAINTENANCE OF WIRE ROPE

HOW TO SEIZE WIRE ROPE

(*Concluded from Data Sheet No.* 641)

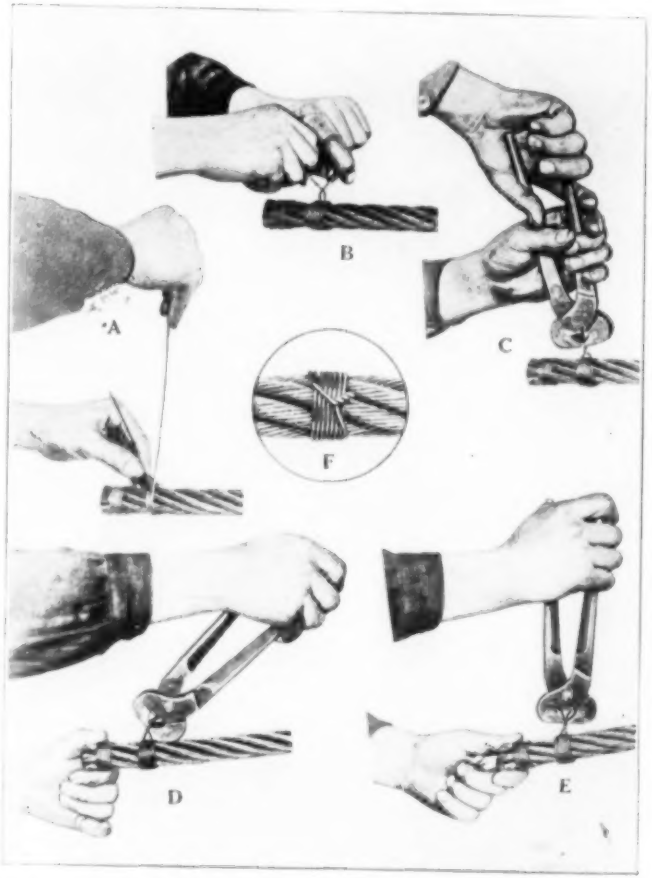
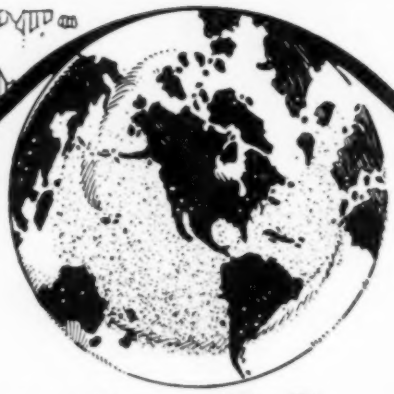


FIG. 2—TO PREVENT UNLAYING, WIRE ROPE SHOULD HAVE AT LEAST THREE SEIZINGS. THE PROCEDURE FOLLOWS THE LETTERS



Around the World with The Foundry

Little Journeys to the homes of our readers

Austria

GOLD MINES of Austria have been worked continuously since the invincible Roman legions pushed their way into the country and sowed the first seeds of civilization among the barbarous tribes at that time inhabiting central Europe. Gold was taken back to the Imperial City when the legions returned in triumph from their foreign campaigns. Gold served to raise the Roman empire to the pinnacle of its power and glory and gold was one of the causes of its downfall.

First and last the yellow metal has been a powerful historical factor and it still is mined in Austria from the same inexhaustible sources that have yielded to every known method of production from the crude pick of the soldier which only recovered the larger lumps, to the most modern and highly scientific apparatus which can return a handsome profit from the wastes and tailings.

The country's lead mines are the most extensive in Europe and the great salt mines of Galicia, tapping a deposit 300 miles long, 1200 feet deep and with nearly 40 miles of galleries and underground workings, is one of the natural wonders of the world. The technical press is on a par with the industrial development of a country that exploits every known mineral with the exception of platinum and converts them into finished products. This press quotes freely from the columns of THE FOUNDRY and in addition copies are received twice a month by the executives of several of the leading casting plants.

"Wherever metals are cast you'll find THE FOUNDRY"

Co-Operation Is Essential

Brass Foundry Losses May Be Lowered By Careful Supervision of All Details—Molders and Technicians Must Work Together

By Fred L. Wolf

FOUNDRY losses are always of vital interest to foundrymen. Loss records afford an index to the efficiency of the personnel and methods employed. For many years we made brass castings by *rule of thumb* methods and our losses compared favorably with other foundries doing similar work. I recall a meeting which was called by our work's manager in which we discussed our loss records as compared with those of other foundries. It was decided that 8 per cent was a reasonable loss figure and that we would be happy if we could maintain such a figure. At periods our loss had gone as high as 11 per cent. A special drive against foundry losses was made and with the co-operation of the foundry foreman, the instructors, the molders and all concerned, losses were reduced to the mark we had set. We were far from satisfied, however, so extra efforts were put forth and as a result the 8 per cent loss figure was actually cut in half. Following is the record of our brass foundry losses since 1922, first by pieces and then by weight.

Year	Pieces per cent scrap	Weight per cent scrap
1922	7.2	8.5
1923	7.0	8.4
1924	3.6	4.2
1925	3.4	4.0

You will no doubt be interested in knowing how these losses occurred. In the accompanying table they are classified as to cause for rejection.

During this same period we have also tightened up on our standards of inspection. Castings are now thrown out for defects which formerly were considered minor and allowed to pass. This reduction in losses has been due to no individual effort nor to any one change in process. There has been a general campaign to improve every operation in the foundry and to develop an esprit de corps on the part of the entire organization. It will be impossible to give a detailed account of every factor that has helped to bring down the losses to the present figure, so I shall mention briefly only a few that have had the most to do with the problem of losses.

A loss record that properly classifies losses helps to place responsibility for them which in turn reacts to reduce the losses. To accomplish these ends, however, they must be accurate and must be given the proper publicity among the workmen involved in the processes.

Our molders are paid piece rate for the good castings they make. Each molder's castings are counted and kept separate until inspected. Defectives are classified as dirty, shifted, misrun, etc., and are held a short time for examination by the instructors and molders. The instructors are expert molders of semi-foreman capacity in charge of sections of the molding floors. In other words, each instructor has a number of molders for whose equipment and work he is responsible. These men are paid a weekly wage plus a bonus which is determined by the number of men they are instructing and the percentage of loss. They receive an hourly rate of 70c per hour plus a weekly bonus calculated by subtracting the week's loss from 10 per cent, and then taking that figure times 2½ times the wages received by their men and divided by 10.

The complete loss record is charted daily and posted on a rather elaborate bulletin board in the foundry. Each day's loss of every molder, classified in detail, is available for inspection by the molders and their instructors about noon of the following day. Special efforts are made to give these charts the utmost publicity. Especially low losses are blocked off in blue and high losses in red to render them more conspicuous. The charts are arranged so that they expose the detailed report for one day and the total loss figures for several preceding days, thus affording opportunity for comparison. The average weekly loss for each instructor is plotted graphically and every effort is made to promote competition among the instructors as well as among the molders. Our experience with piece rates and loss records has led us to recognize the tremendous value of the spirit of friendly rivalry among workmen and personal pride in low losses.

A committee consisting of a member of the technical department, the manufacturing superintendent, the foundry foreman and pattern department foreman, was organized to handle gating problems and pass on all pattern equipment. A careful study was made of the daily loss report and it was found that certain castings were regular offenders. The pattern was examined and in many cases it was found that the loss was directly due to wrong gating or imperfections in the pattern. It is our policy to have this committee determine the method of gating all new work; they determine the type of pattern that will be made, the number of pieces in a flask, the location and size of risers, etc. Upon completion the pattern is given a trial run of a few molds, the castings are examined and sawed in pieces to locate draws or shrinks;

Obtain Results

FOUNDRY losses cannot be reduced until the root of the trouble is discovered. Attention must be given to all materials entering in the production of the finished casting, including molding sand and metals, to determine their fitness. The personal equation is present always, and to have the best results from technical supervision, a friendly, co-operative spirit must be maintained between the molders, foremen and the technical department. In this article which was abstracted from a paper read by Fred L. Wolf, technical director, Ohio Brass Co., Mansfield, O., at the Ohio Foundrymen's convention held at Cincinnati Sept. 17 *and* 18, *the author describes the methods practiced in the foundry of the Ohio Brass company. The points stressed are the co-operation between the men and the technical department, and the rivalry for low loss reports by the molders on the various floors.*

finally when found O.K. in every respect, the pattern is released.

The technical department with its laboratories occupying a floor space of about 6000 square feet, is not merely a show place used to impress visitors and customers. It is connected so closely with the plant processes that it functions almost as a manufacturing department. The chemical laboratory is thoroughly equipped and occupies about 2000 square feet of space. Equal space is occupied by physical testing and metallurgical laboratories. The equipment includes a testing machine, manufactured by Tinius Olson, Philadelphia, Izod impact machine, hardness testing machines, a small machine shop, a high frequency electric furnace, manufactured by the Ajax Electrothermic Corp., Philadelphia, and a molding bench.

So far as possible we buy all raw materials on specifications. Frequently these specifications are developed in our own laboratories. Incoming shipments are examined or tested and if not up to standard are rejected or an adjustment in price is obtained. Deleterious impurities or poor quality in any other way calls for rejection, while slightly wrong composition as, for instance, too low copper and tin in brass ingot may permit adjustment in price.

The technical staff is searching continually for means and methods to improve our processes and eliminate waste. Whenever a process is worked out by the technical staff it is not only put in operation in the plant but is given direct supervision thereafter. This necessitates direct personal contact between the technical staff and the plant operatives at all times.

In the foundry the technical man acts as a watchdog. He calculates all the metal mixtures, establishes furnace practice and sees that it is properly carried out, he determines the proper pouring temperatures for various alloys and various patterns so that the desired physical properties are obtained, he checks the physical properties of the molding sand and determines the sand additions to the heaps, he specifies the core sands and binders and determines the core sand mixtures and acts in a general advisory capacity to the foundry foreman and his assistants.

We have given a great deal of attention to the selection of the proper type of melting furnace to produce the best metal at reasonable cost. I have had many years' experience with brass melting furnaces; these have included open flame, oil and gas-fired, non-crucible, oil and gas-fired crucible, smothered-arc type electric, direct-arc type, rocking furnaces and the induction furnace. At one time we operated the three types of furnaces mentioned above at the same time so were able to make close comparison. We found that, when the furnaces were operated properly, equally good metal could be produced by any of the furnaces. However, in some of them, it was easier to produce good metal than in others, in other words, some furnaces required less care in handling,—are more nearly *fool-proof*.

If the foundryman uses high grade prime metals and brass ingot, uses only his own scrap, gates and sprue and takes the proper precautions in melting and pouring, he should have no difficulty with his castings. On the other hand, if all kinds of junk, concentrates, grindings and the like, are used in the melting furnace, a proper flux should be used by all means to clean out impurities.

Classified Rejection Losses

Year	Dirty per cent	Shifts per cent	Misruns per cent	Core per cent	Castings per cent	Other per cent
1922	4.4	1.2	2.4	.....	0.5	.....
1923	4.3	1.1	2.5	.....	0.5	.....
1924	1.9	0.7	1.1	0.06	0.3	0.14
1925	1.7	0.5	1.2	0.05	0.01	0.54

Molding Sand Is Important

An item of real importance to the foundryman is that of molding sand. During the past few years a great amount of work has been done on the molding sand problem and yet the field merely has been scratched. I shall briefly outline our methods in sand practice at the Ohio Brass Co.

We aim to hold our molding sand heaps at a bond strength between 0.27 and 0.31 lb. per square inch tensile and 18 to 25 permeability depending on the type of work being made on each particular floor. In one corner of the foundry we have a bench and testing equipment consisting of the standard American Foundrymens association permeability meter and a combination tensile device and rammer. The tensile test measures the bond strength of the sand. A special two-piece cylinder is required for this test. A specimen of sand two inches in diameter and two inches long is rammed up in the cylinder exactly as is done for the permeability test. The permeability is measured, the cylinder is then rested upon the rammer base and a spring balance is hooked to the upper end. By turning a crank tension is applied until the specimen of sand breaks.

The permeability and bond tests are made by a foundry operative who also makes all sand additions. Each heap is tested at least once a week, sometimes every day, depending on the work being made in the heap. The results of the tests on each individual heap indicate the kind of sand to be added and the sand mixtures are made up accordingly.

Weekly tests for clay and grain fineness are made on three samples in the laboratory. We find this test necessary because bond strength is due not only to clay content but also to the distribution of the clay, hence when bond strength in the heap is low, the trouble may be due either to low clay or poor cutting. High clay is apt to give trouble due to difficulties in ramming and excess moisture requirements so we find it advisable to carefully control the clay content of our heaps to 7 to 9 per cent. Our heaps average 130 to 150 grain fineness. This is the mesh of the screen through which the sand would just pass if averaged in size.

We carry in stock a No. 1 sand of grain fineness 160 to 180, and clay content 6 to 9 per cent, also a coarser No. 2 sand 110 to 120 grain fineness, 6 to 9 per cent clay. For bonding purposes a red sand from Gallia county of about 30 per cent clay is used. The sand additions are mixed in a muller and then wheeled on the molding floors.

Floor sweepings from the foundry are passed over a 16 mesh screen and the fines are used in the sand mixtures. About 60 per cent of our sand additions are refuse sand, none of which has been discarded for about three years. The red sand is used to rebond it while the No. 1 and No. 2 sands are used to control permeability.

During the years 1922 and 1923 our new molding sand costs averaged $1.00 per ton of good castings produced. During the following year we inaugurated the control and reclamation

works with the result that the new sand cost only 41 cents per ton of castings and in 1925, 18 cents per ton. While the cost of recovering sand and preparing the sand mixtures is a considerable item, the saving in new sand cost more than offsets it and gives us in addition the advantages of sand control.

Well trained and experienced chemists, metallurgists and engineers are not always conducive to low foundry losses. There must be one hundred per cent co-operation between the technical staff, the foreman and the workmen. It is not always an easy matter to sell scientific methods to foremen and their assistants. In some cases it has required a great deal of patience and tact to win men to these new methods, especially when they are departures from ordinary practice.

Much of the development work is done in the foundries and the foremen and their assistants take a hand in it. They are consulted continually and so are made to feel that the idea is partly their own. Original thought on their part is encouraged and care is taken to see that credit is given to them for their part in every development. Furthermore, just so far as possible, we try to acquaint the worker with the reason for every change made in his materials or process. We have taken groups of instructors and molders into our laboratory and have discused with them the methods used in controlling the metal, cores and sand. The pyrometers were explained to them. The effect of incorrect pouring temperature was discussed. They were shown how to measure the bond, the permeability and the moisture content of molding sand. The relation of these properties to casting losses was discussed.

We have also tried to carry the laboratory into our foundries. The control tests of the molding sand are made by the man who makes the sand additions to the heaps and they are made in the foundry. Core sand tests are made by a core room assistant. Temperature measurements on the molten metal are made by a foundry assistant. All these tests are made in the foundry and molders are encouraged to avail themselves of the tests whenever they feel the need. For instance, a molder is getting misrun castings. He takes a sample of his sand over to the test bench and has it examined for permeability and moisture content. He sees the tests made. If they show proper values, he looks further for his trouble. He checks on the pouring temperature of his metal; with his own eyes he can see that it is hot enough. He is encouraged to seek help on his problems and does seek help. This has resulted in a spirit of co-operation between the technical department and foundry workmen that makes for greatest efficiency.

Show Greatest in History

(*Concluded from Page* 824)

facturers. Liquid and dry binders were shown in practically every variety by 18 firms and in nearly every instance a wide range of cores was shown to illustrate the possibilities of the materials. The booth of Frederic B. Stevens, Inc., Detroit, contained samples of a great many of his products and in addition was ornamented with an upright glass case in the center with a number of shelves supporting a collection of miniature elephants carved from a great variety of materials ranging from ivory to graphite and in height from 2 inches to 12. The booth of the Obermayer Co., Chicago was arranged in the form of an open court with a center made up of a circle of blooming plants in pots around a central fountain made up with bark to resemble a large tree trunk. The general effect was exceedingly pleasant and restful and offered marked contrast to scenes of industrial and material activity with which it was surrounded.

Producers of clay, core sand, molding sand and sand for sandblasing purposes were represented extensively by 14 of the leading companies in the East and Middle west. These included such well known institutions as Albany Sand & Supply Co., Albany, N. Y.; Ayers Mineral Co., Zanesville, O.; Eastern Clay Products Co. Rochester, N. Y.; Great Lakes Foundry Sand Co., Detroit; Hougland & Hardy, Evansville, Ind.; Keener Sand & Clay Co., Columbus, O.; Peerless Sand Co., Conneaut, O.; Charles Pettinos, New York; George F. Pettinos, Philadelphia; Portage Silica Sand Co., Youngstown, O.; Standard Silica Co., Chicago; Superior Sand Co., Cleveland; Warner R. Thompson Co., Detroit; United States Silica Co., Chicago and Whitehead Brothers Co., main office, Providence, R. I.

Majority of the booths occupied by the foundry supply establishments were fitted up as rest rooms and meeting places and in addition displayed a few lines of their various products. Samples of graphite in various stages, also foundry facings were shown by the Asbury Graphite Mills, Asbury, N. J.; and by the United States Graphite Co., Saginaw, Mich. Vent wax in various sizes was on display in the booth maintained by the American Vent Wax Co., Lockport, N. Y. Cleveland Wire Spring Co., Cleveland exhibited steel foundry barrels, boxes, core racks and other handling equipment. The booths of the Federal Foundry Supply Co., Cleveland and the Hill & Griffith Co., Cincinnati were devoted mostly to the entertainment of visitors. Foundry facings, core compounds, supplies and small articles of equipment constituted the display by the J. S. McCormick Co., Pittsburgh. Special shoes for foundry workers were shown by the Rohrbacher Shoe Co., Boston. A liquid window cleaner was demonstrated by the Skybryte Co., Cleveland. Wadkin & Co., Leicester, England, exhibited a semiautomatic wood working milling machine and an operator demonstrated the wide range of its application on wood blocks.

Reduce Cupola Diameter

Question: Our cupola usually lined to 36 inches has been reduced to 28 inches diameter until business again warrants the larger size. We still use the same blower and although we close the blast gate in the pipe to a certain extent. We are wondering if we are in danger of oxidizing the iron.

Answer: Regulation of the blast volume by a situable gate in the main pipe is practiced extensively and is quite satisfactory as far as cupola melting conditions are concerned. A little extra expense in insured in the amount of current consumed in driving a large motor where a smaller motor would serve a smaller blower. However, since you intend eventually to remove the lining and return the cupola to its original diameter of 36 inches, that detail is of little consequence.

Figure Contraction

Question: On the pattern for a steel casting 5 feet long I allowed a contraction of 1/60, in this case 1 inch. The casting is 5/16-inch undersize. What is the reason.

Answer: The usual contraction allowance for steel castings is ¼-inch to the foot, or about 1/50. If you had observed this rule your casting would have come out right. Occasionally where normal contraction is hindered by the shape of the mold or core, the total contraction might not work out to the rule, but any deviation only can be anticipated by an experienced operator.

How and Why in Brass Founding

By Charles Vickers

Soda Affects Aluminum

We manufacture brass containers which are used in connection with sterlizing and washing milk and beer bottles. A solution of caustic soda is used to clean the bottles, then they are well rinsed and thoroughly washed. The supposition is that all the soda is washed off the bottles when they are rinsed and before passing to the washer, but in actual practice all the soda is not washed off. The brass containers are used on the washer. Our customers ask us whether aluminum alloy containers would not be as satisfactory as the brass ones, and we would like to be advised whether, under the circumstances, aluminum could be used in place of brass.

Aluminum alloy containers would not be as satisfactory as brass ones, because aluminum is attacked by alkaline solutions, and in fact even plain water will attack aluminum, whether rolled or cast.

This easily can be proved, by putting water in any household utensil made of aluminum and allow it to stand for a week or two. Little tufts of a whitish gelatinous substance will form and adhere to the container here and there, and when brushed away leave a pitted surface. In time there will be holes entirely through the metal. With alkali in the water the attack will proceed with much greater rapidity. It would not be safe for the reputation of the makers of the machinery to put it out for such service using aluminum, or aluminum alloy containers. It will be safer to stick to the brass.

Increasing Metal Density

We manufacture a small musical instrument and find an alloy of 90 per cent tin, and 10 per cent antimony, best suits the purpose of tone quality. However, to produce deeper tones, we must increase the weight of the mixture from one-third to two-thirds or near that. Can you tell us what to add to make this change that will not affect the toughness or hardness, or deaden the tone?

The density of the metal will be increased by alloying therewith a metal of higher densities than tin or antimony, which have specific gravities close together. Thus, if lead can be added, the specific gravity of the alloy will be increased as lead is considerably heavier than either tin or antimony. Copper has a higher specific gravity than tin or antimony, and an alloy of tin 85 per cent; antimony 10 per cent, and copper 5 per ment, is tough and would be slightly more dense than the alloy now being used. Possibly an alloy of 20 per cent lead; 3.5 per cent antimony; 3.5 per cent copper and 73 per cent tin would give the tone values desired.

Melt Brass in Cupola

We would like to learn the best way to make a casting weighing 2000 pounds of yellow brass, using an iron foundry cupola as the melting medium. Please advise us as to the kind of fuel required and how to charge the cupola.

A number of articles have appeared in past issues of THE FOUNDRY instructing how to melt nonferrous metals in the cupola. In the July 15, 1919 issue on pages 479-481 an article, Cupola Metal for Bronze Castings appeared and again in the Dec. 1, 1924 issue, pages 927-928 an article by T. F. Jennings on Melting Copper in the Cupola was published.

These articles enter into the subject fully and leave little to the imagination. Both authors mention that a milder blast was used than is usual for cast iron. Jennings states he used 8 ounces blast. In the main the cupola is prepared, charged and tapped the same as for iron, but Jennings sandwiched his copper in charcoal to prevent contact with the coke as much as possible. To make a yellow brass casting; melt the copper in the cupola, bring it down hot into a heated ladle and add the zinc, previously made hot, but it is doubtful whether it is advisable to melt the zinc, because when molten zinc is poured into molten copper a strong reaction takes place which produces dense fumes and a great hissing noise. If the men are familiar with this action, it might be well to melt the zinc and add it in the molten state.

After the zinc addition, the mixture should be poured back and forth from one hot ladle to another to mix the metal thoroughly. Use a coarse grade of sand for the molds; vent thoroughly, and have them bone dry and hot when the metal is poured.

Use Oxidizing Flame

We have trouble from gas holes in the case of bronze bushings, the alloy containing copper, 72 per cent; lead, 21 per cent; tin, 5 per cent; zinc, 2 per cent. We melt in an oil-fired crucible furnace and place several handsful of charcoal in the crucible before charging and add phosphor copper as a flux. The heat is started with copper wire, 20 pounds then some 80-10-10 ingot, and bearing scrap, the lead being added last. We understand there are four causes of porous castings; sand too wet; sand rammed too hard; cores too hard or metal improperly melted. We are inclined to think our trouble is due to the metal being heated too hot, or the flame in the furnace is mixed incorrectly. We welcome your suggestions.

As the castings come porous in spite of the use of phosphor copper, it is likely you are correct in assuming the flame is not properly adjusted. Either an oxidizing or a reducing flame can be used to melt with, and of the two the oxidizing flame is the safest as far as getting sound castings is concerned. We suggest that more air be turned on, or else that the oil be shut off a little. There is considerable difference between melting in an oil-fired crucible furnace and in a coke hole. In the latter type, charcoal is an asset of value, in the former it is an asset of such doubtful value that many founders do not believe in using it. If the melting is done fast enough no covering is necessary, because it requires the time element to oxidize metal sufficiently to be harmful enough to spoil castings. Forget the charcoal for a couple heats, use an oxidizing flame and melt rapidly and get the metal hot in the furnace, then cool when on the hearth, which is the proper place to adjust pouring temperatures for all but thin castings, and for them the mold side is the place. As the bushings are no good now with the charcoal they cannot come any worse without it. If the furnace works slow, put a little crushed anthracite coal on top of the metal.

EUROPEAN FOUNDRYMEN Visit Industrial Cities

AFTER attending the Second International Foundrymen's congress and the thirtieth annual convention and exhibition of the American Foundrymen's association in Detroit, the delegation of European foundry representatives left for Chicago Oct. 3. Previous to the convention, the overseas delegation were entertained in New York, Philadelphia and Buffalo.

Upon arriving at Chicago, the visitors were transferred to the Morrison hotel, where an informal reception was held. On Monday the ladies of the party were taken to various points of interest in the city and the men were given the opportunity of visiting a number of large foundries and manufacturing plants in the mertopolitan area.

The climax of the Chicago visit was a banquet held in the Union League club Monday evening, at which Charles Piez, chairman, Link-Belt Co., presided. He introduced as the principal speaker, E. H. Hurley former head of the United States shipping board.

Mr. Hurley expressed the hope that a settlement of the foreign debt might soon be arrived at more agreeable to the French ministry, but declared that nothing could or would be done on the matter until the French debt definitely had been signed as it exists today. Concerning the recently organized European combine of iron and steel interests, he suggested that the enterprise might well develop along the lines of American trade associations, founded basically on fundamental economic laws, stating that with such a foundation fair prices and reasonable profits would follow naturally.

Frank Russell, vice president of the British Refractories associations, London, said that if America continues to progress as it has, there is not the slightest reason why it should not conquer the hearts of the world, by reason of "what it has done for the advancement of industrial science over the entire world."

The American Foundrymen's association was complimented highly on its efficiecy in the organization of the program for visiting delegates by E. V. Ronceray, vice president of the Association Technique de Fonderie de France and by Dr. ing. Geilenkirchen managing director Verein Deutscher Eisengiessereien, Dusseldorf, Germany.

On Tuesday, Oct. 5, the party visited plants in Chicago, and left that evening for Cleveland. Wednesday they inspected the Cleveland plants of the Otis Steel Co., Wellman-Seaver-Morgan Co., Aluminum Castings Co., Allyne-Ryan Foundry Co., Cleveland Co-operative Stove Co., Ohio Foundry Co., Osborn Mfg. Co., W. W. Sly Mfg. Co. and the Johnston & Jennings Co.

A spirit of intentional goodwill and co-operation among industrial leaders was emphasized Wednesday evening, Oct. 6 at the banquet tendered representatives of European foundries by Cleveland foundrymen.

Industrial democracy today is more perfect than political democracy, declared City Manager Hopkins in addressing an assemblage of 250 at the banquet in the Union club. He referred to his own early experiences in steel mills. When he was a young man, he said, it took 100 men a day to roll 100 tons of rails, at hot, hard work, whereas now 10 to 20 will roll 1000 tons, with less labor.

S. W. Utley, Detroit, president-elect, American Foundrymen's association, urged the European visitors to take back with them assurances of American goodwill, and to convince their countrymen that we are sincerely striving for world peace. We foundrymen can make no worse use of iron and steel than to put them into guns and cannons, he said.

James R. Garfield, former secretary of the interior, drew an eloquent word picture of the resources of the United States, and how they have been developed by means of some of the best labor from European countries.

Fred W. Ramsey, director, Cleveland Metal Products Co., toastmaster, alluded to the international Y. M. C. A. conference in Helsingfors, Finland last year, attended by 1500 young men "lighting the torch of international friendship."

Others who spoke briefly were John A. Penton, chairman, Penton Publishing Co., and Franklin G. Smith, president Osborn Mfg. Co., general chairman of the Cleveland committees having charge of the arrangements for the two-day visit of the European foundrymen.

E. V. Ronceray, vice president, Association Technique de Fonderie de France, responded in behalf of the visiting delegation, thanking the American foundrymen for their courtesies to them.

Thursday the visitors were taken to the plants of the White Motor Co. and the Cleveland Electric Illuminating Co. They had lunch in the Penton building as guests of the Penton Publishing Co., publishers of THE FOUNDRY, and then inspected the editorial, business and printing departments of that organization.

The party arrived in Pittsburgh Friday morning, Oct. 8 and spent the morning inspecting a large steel plant and the Westinghouse Electric & Mfg. Co., East Pittsburgh. After luncheon the visitors were taken through the plant of the Westinghouse Air Brake Co. at Wilmerding. Saturday the delegation was taken through the H. J. Heinz Co., where luncheon was served and then to the Carnegie Institute of Technology, the Carnegie Institute Museum and the Art gallery. A complimentary dinner was served at the Fort Pitt hotel Saturday evening.

The party left Sunday morning for Washington where points of interest were visited. The delegation went to New York Tuesday morning and sailed on Oct. 13.

To Develop Standards

Organization of a committee to carry on the work of standardizing the quality of zinc coatings for iron and steel just has been completed by the American Society for Testing Materials under the auspices of the American Engineering Standards committee. The following technical subcommittees are ready to begin their work: Hardware and Fastenings, R. F. Hosford, American Telephone & Telegraph Co., New York, chairman; Sheets and Sheet Products, J. T. Hay, United Alloy Steel Corp., Canton, O., chairman; Plates, Bars, Structural Shapes, V. F. Hammel, Electric Bond & Share Co., chairman; Pipes, Conduits and Their Fittings, F. N. Speller, National Tube Co., Youngstown, O., chairman; Wire and Wire Products, J. C. Johnson, Pennsylvania railroad system, chairman; Methods of Testing, C. D. Hocker, Bell Telephone laboratories, New York, chairman.

The Shakeout

DAN M. AVEY, Editor

PAT DWYER, Engineering Editor
FRANK G. STEINEBACH, Associate Editor

CHARLES VICKERS, Nonferrous Editor
EDWIN BREMER, Associate Editor

¶ Favor Change to Spring

THE closing day of the Detroit convention brought forth many warm expressions of appreciation for the decision of the board of directors to hold the next annual convention in the spring. Those who have endured the rigours of late fall weather at state fair grounds during the past few years will welcome the opportunity to attend an American Foundrymen's association convention without this handicap of physical discomfort. When the meetings are held in the fall, it has been found necessary to wait until after the state fair in the convention city had been disbanded. State fair grounds are designed for summer use and heating facilities never have been found adequate in the past few years.

ANOTHER feature which influenced the decision of the board is the fact that so many technical conventions take place in the fall. It is not uncommon for the contributor of a paper to the A. F. A. convention to find that he also is scheduled for appearance at one or two other conventions immediately preceding or following, if not coincident with the date of the A. F. A. convention. Further, from the standpoint of the regular attendant, this multiplicity of conventions in the fall happily will be avoided by the spring meeting.

EQUIPMENT manufacturers, particularly those who are directly responsible for the planning, shipment and erection of the stupendous exhibits which now characterize the American Foundrymen's association shows, will be glad to have an opportunity to do this work through the winter season and thus be able to enjoy the vacation season in the summer without the pressure of the added work due to the exhibition.

THE omission of the exhibition feature next spring will permit the selection of any one of a number of cities that gladly would welcome the American Foundrymen's association convention but which have not sufficient exhibit hall or other facilities to accomodate a show such as has characterized the A. F. A. conventions in the past few years. Opinion seems to be unanimously in favor of the change to the spring.

¶ Foundry Supplies Gain

ESTABLISHMENTS primarily engaged in the manufacture of foundry supplies reported a total output valued at $12,723,120, according to data gathered at the biennial census of manufactures in 1925 by the department of commerce. This total value shows an increase of 24.2 per cent over the previous census in 1923 when the value was given as $10,247,864. Pennsylvania was the leading state in the number of manufactories as out of the 66 reporting, 20 were in that state. Ohio ranked second with 19, Illinois was third with 9, New York fourth with 6, Michigan and Alabama had 3 each, 2 were in Connecticut and the remaining 4 were in other states.

THE average number of wage earners employed in 1925 was 1087 compared to 966 employed in 1923, a gain of 12½ per cent. In wages these employes received $1,360,219 for 1925 against $1,162,068 received in 1923, or a gain of 17.1 per cent. By the various processes of manufacture used in better fitting the products for use in the foundry industry, a value of $5,819,442 above the cost of materials, fuel and electric power, was added in 1925. Through these same processes in 1923 a value of $5,425,253 was added to the products making a gain for 1925 of 7.3 per cent. The largest gain noticed was in the use of primary horsepower where in 1925 the amount was 10,733 compared to 7736 for 1923.

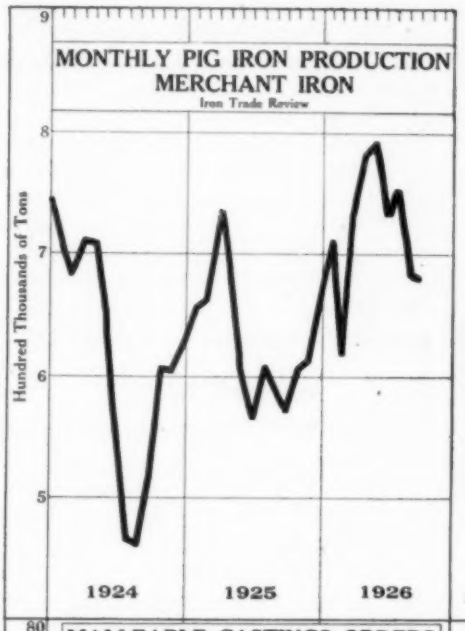
THIS increase in the output of foundry supplies is not unexpected because the foundry industry as a whole enjoyed a favorable period, and as long as conditions remain as they are, an increase may be expected again this year. Foundry equipment and foundry supplies go hand in hand, and reports thus far indicate, that the equipment manufacturers have increased their business over that for the same period last year.

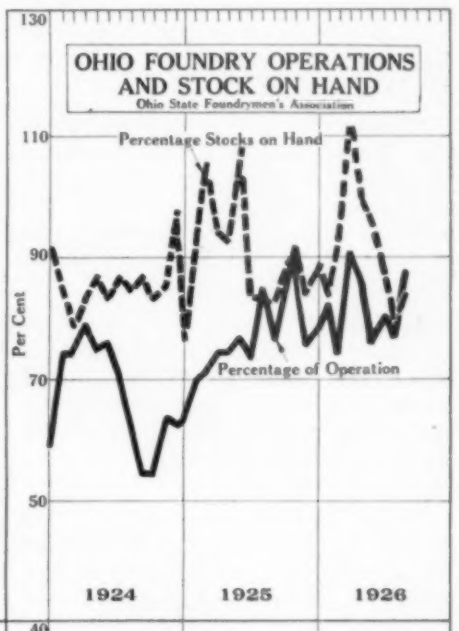
Trade Trends in Tabloid

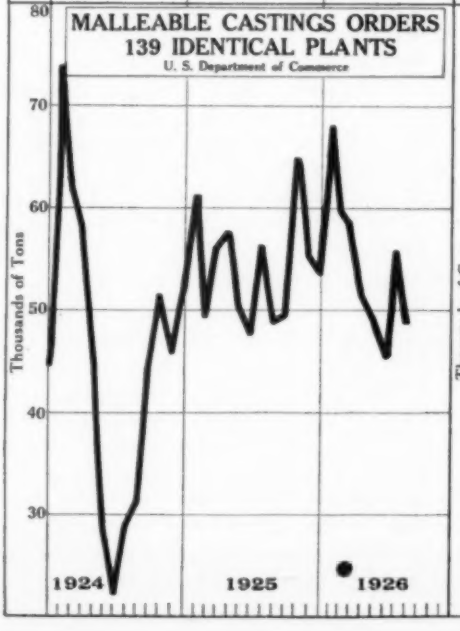
NO DOUBT exists that foundry operations in general are improving and that the prospect of business for the remainder of the year is bright. An encouraging factor in the general situation is the re-entry of railways into the market for cars and equipment. Implement makers are active and are buying steel in quantities which indicate continued demand. August production of automobiles was nearly 70 per cent ahead of the same month last year. Building contracts are keeping pace with the fall of last year which was a record breaker. The steel industry has entered the fourth quarter without any slackening in sight. The Ohio State Foundrymen's association reports August operations at 87.6 per cent of normal, practically a 10 per cent increase over the preceding month. The production of iron in September, according to *Iron Trade Review* totaled 3,161,604 tons, only slighty less than the preceding month, but on a daily average basis the total output was the highest for any September since 1918. The daily average prices of nonferrous metals in New York, during September, according to the *Daily Metal Trade* were as follows: Casting copper, 13.85c; electrolytic copper, 14.303c; Straits tin, 68.847c; lead, 8.784c; antimony, 15.481c; aluminum, 27.00c and zinc was 7.423c, E. St. Louis, Ill. Recovery in the textile industry in New England should increase foundry operations there.

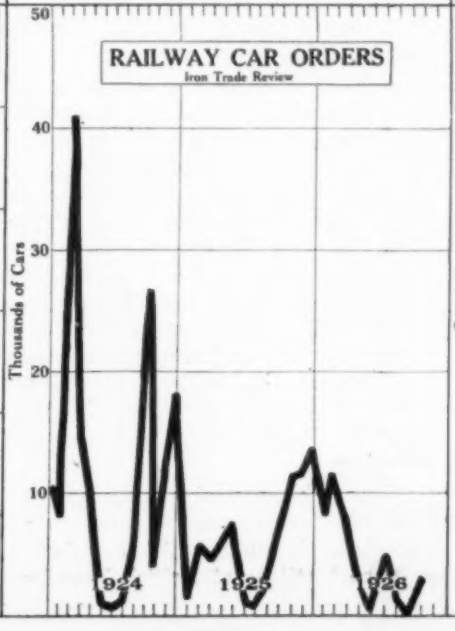
RAW MATERIAL PRICES
Sept. 4, 1926

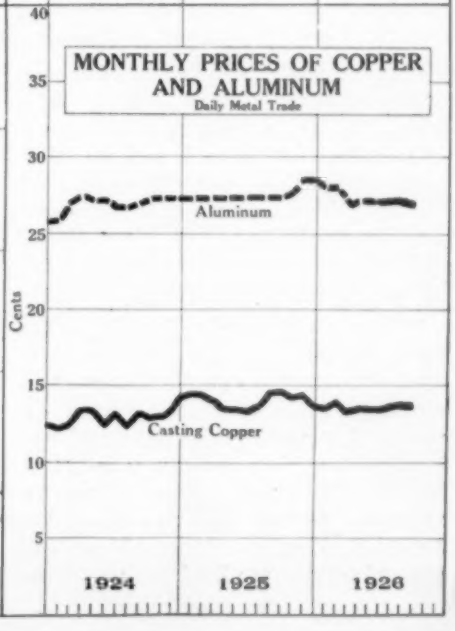
Iron	
No. 2 foundry, Valley	$18.00 to 18.50
No. 2 southern Birmingham	20.00
No. 2 foundry, Chicago	21.00
No. 2 foundry, Philadelphia	21.76 to 22.39
No. 2 foundry, Buffalo	20.00
Basic, Valley	17.50 to 18.00
Basic, Buffalo	19.00
Malleable, Chicago	21.00
Malleable, Buffalo	20.00
Coke	
Connellsville foundry, coke	$4.00 to 4.50
Wise County foundry, coke	4.50 to 5.00
Scrap	
Heavy melting steel, Valley	$17.25 to 17.50
Heavy melting steel, Pitts.	17.00 to 17.50
Heavy melting steel, Chicago	13.25 to 13.50
Stove plate, Chicago	14.25 to14.50
No. 1 cast, New York	14.50 to 15.00
No. 1 cast, Chicago	17.00 to 17.25
No. 1 cast, Philadelphia	17.50 to 18.00
No. 1 cast, Pittsburgh	16.50 to 17.00
No. 1 cast, Birmingham	16.50 to 17.00
No. 1 cast, Buffalo	16.00 to 16.50
Car wheels, iron, Pittsburgh	16.00 to 16.50
Car wheels, iron, Chicago	14.50 to 15.00
Railroad mall., Chicago	16.50 to 17.00
Agricultural, mall., Chicago	15.25 to 15.75
Malleable, Buffalo	17.50 to 18.00
Railroad Malleable, Pitts.	18.50 to 19.00
Nonferrous Metals	Cents per pound
Casting copper, refinery	13.80
Electro copper, producers	14.25
Straits tin	71.50
Lead, New York	8.60 to 8.65
Antimony, New York	13.50 to 14.00
Nickel, electro	39.00
Aluminum, No. 12 prod'rs	26.50
Aluminum, No. 12, remelt	22.50 to 23.00
Zinc, E. St. Louis, Ill.	7.35











Personal

L. P. Feustman has resigned as vice president of the Worthington Pump & Machinery Corp., New York.

J. W. Haynes, formerly foundry foreman with the Hayes Pump & Planter Co., Galva, Ill., now is connected with the Maytag Co., Newton, Iowa.

Robert Tolmie, 86, with a record of 75 years in the foundry, still is connected actively with the management of the Lobdell Car Wheel Co., Wilmington, Del.

James F. Lanigan, 85 years of age, and owner of the Davis Foundry Co., Lawrence, Mass., was at the convention to see the latest developments in the foundry industry.

John K. Tener, Charleroi, Pa., former governor of Pennsylvania, and associates have applied for a charter for a steel manufacturing company to be know as the Charleroi Steel Foundries Co., Charleroi.

Charles L. Newcomb, manager of the Deane works of the Worthington Pump & Machinery Corp., Holyoke, Mass., was elected one of the vice presidents of the American Society of Mechanical Engineers at the Election recently held.

Leonard S. Horner has been appointed president of the Niles-Bement-Pond Co., New York, to succeed James K. Cullen who resigned to devote his entire time as president and general manager of the Niles Tool Works Co., Niles, O.

J. H. Whiting, chairman, Whiting Corp., Harvey, Ill., one of the charter members of the American Foundrymen's association and the first man in the United States to melt 300 tons of iron a day, took a keen interest in the convention.

Job Goostray, Hunt-Spiller Mfg. Corp., Boston, a veteran foundryman and author of several articles that have appeared in THE FOUNDRY, held the attention of a group of interested foundrymen at the Detroit convention while he explained how he had cast big guns used in the civil war.

William Smith, who has been appointed sales manager of the Lawrenceville Bronze Co., Pittsburgh, was formerly employed in a similar capacity by the Falcon Bronze Co., Youngstown, O. Prior to that time, Mr. Smith was general master mechanic at the Eliza works of the Jones & Laughlin Steel Corp., and general master mechanic at the Pennsylvania Steel Co., Steelton, Pa., and the Midvale Steel Co., Coatesville, Pa. Upon the death of his brother, James Smith, he succeeded him to the presidency of the New Process Copper Casting Co., this company later being merged with the Lumen Bearing Co.

George K. Elliott Died After Operation

George K. Elliott, chief metallurgist of the Lunkenheimer Co., Cincinnati, Nationally known for his activity in electrochemical and foundry circles for many years, died Sept. 23 following an operation for appendicitis. Mr. Elliott was born at Sydney, O., and spent all his life in the Buckeye state, the greater part in Cincinnati. After

GEORGE K. ELLIOTT

graduating from the University of Cincinnati, he taught science for a short period before entering the industrial field.

As chief metallurgist and head of the chemical department of the Lunkenheimer Co., his activities were distributed over the foundry metallurgy of steel, cast iron, and nonferrous metals. He was responsible for the development of the duplex process for cast iron which involves the use in tandem of the cupola and the electric furnace. The metallurgy of cast iron in relation to electric furnace practice formed the subject of several papers which he prepared for the American Foundrymen's and other associations.

After the annual exchange of papers had been arranged between the American Foundrymen's association and the Institute of British Foundrymen, Mr. Elliott was selected by the American Foundrymen's association to present the first paper on its behalf. Effect of superheating cast iron in the electric furnace was the subject of the paper which he presented at the Blackpool meeting of the Institute of British Foundrymen, Sept. 15, 1921. At the Rochester, N. Y., convention of the American Foundrymen's association 1922, Mr. Elliott presented a written discussion of the paper which was presented by F. J. Cook on behalf of the Institute of British Foundrymen. He also prepared a paper, "A Shearing Test for Cast Iron" for presentation at the recent convention of the American Foundrymen's association held in Detroit Sept. 27 to Oct. 1.

Mr. Elliott was a past chairman of the Institute of Metals division of the American Institute of Mining and Metallurgical Engineers, past vice president of the American Electrochemical society and past chairman of the electrothermic division. He was a member of several technical committees of the American Foundrymen's association, the American Society for Testing Materials and other technical societies. For a number of years he served on the nonferrous metals advisory board of the bureau of standards. Also he was a member of the Sigma Xi honorary scientific society.

Obituary

William J. Watson, organizer of the Buda Co., Harvey, Ill., and president at one time of this and several other metalworking companies in the Middle West, died Oct. 1 at his home in Chicago at the age of 83. Mr. Watson came to Chicago in 1873 as representative of the Middleton Car Spring Co., of which he became president in 1890. He also was a director of the First National bank, the Security bank of Chicago and the Second Surity bank of Chicago, and for 17 years was president of the board of managers of the Old Peoples' home, Chicago.

Louis Sommerhauser, president and manager of the Spuck Iron & Foundry Co., St. Louis, who died Sept. 27, had been identified with the metalworking industries for 30 years. Mr. Sommerhauser had been president of the Spuck company since 1919, and he had been vice president from its incorporation in 1902 until his election to the presidency. The Spuck company, in addition to operating a foundry fabricated structural steel.

Foundry Supply Firms Increase Sales

According to data collected at the biennial census of manufacturers in 1925 by the department of commerce, the establishments engaged in the manufacture of foundry supplies in that year reported a total output valued at $12,723,120. Total value of products showed an increase of 24.2 per cent in comparison with $10,247,-864 in 1923, the last preceding census year. Of the 66 establishments reporting for 1925, 20 were located in Pennsylvania 19 in Ohio, 9 in Illinois, 6 in New York, 3 each in Alabama and Michigan, 2 in Connecticut and 4 in other states.

Australian Praises American Workers

One of the things that seems to surprise foreign visitors to American factories is the willingness of the workers to explain the details of operations to their less informed brothers, the spirit of helpfulness that prevails throughout the plant and the benefits of plant extension courses. An example of this spirit is given in the house organ published by the manufacturing division of the Fairbanks, Morse & Co., Beloit, Wis., which related the experiences of Raphael N. Hart, Sydney, Australia, who is taking the firm's student course. He says in part:

"Altogether I was made welcome and could not have received better treatment. The men in the shops were good to me and spent quite a bit of their time explaining the details of the Beloit plant products. The information I have received and the night classes have enabled me to understand the firm's products in much better way and will prepare me for a larger scope of work back home."

Beetle Affects Cost of Sand Production

The Japanese beetle, a pest which has been devastating the crops in one of the eastern states has brought about complications in the foundry sand markets of that section. This insect has been multiplying rapidly and its distruction of farm products has lead to quarantining localities where it is encountered. The United States government is enforcing this quarintine so strictly that every carload of molding sand shipped from a certain region must be disinfected at a cost of from 25 cents to 50 cents per ton of sand shipped. This is accomplished by boring through the sides of cars containing sand and forcing into the openings poisonous gases which it has been found will destroy the insect.

Receives Appointment

R. C. Brower, who recently was appointed general manager of the Timken Roller Bearing Service & Sales Co., Canton, O., has been associated with the firm since 1913 in various capacities.

Authority on Stokers Died Recently

Frank C. Armstead, who died on Sept. 7 was identified prominently with the pioneering, management and development of the mechanical stoker. He became connected with the Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., in 1888 and in 1903 was placed in complete charge of the stoker department's engineering and installation work. Mr. Armstead was regarded as an authority on combustion and boiler plant operation.

Changes Sales Personnel

R. E. Prussing for many years district sales manager at Detroit for the Whiting Corp., Harvey, Ill., has been transferred to the main office at Harvey. Mr. Prussing is succeeded at Detroit by W. R. Hans, district manager at Buffalo for the past two years. Buffalo territory will be handled by C. G. Crewson, A. E. Smith and associates of the Industrial Equipment Co., Buffalo.

Makes Big Steel Casting

A locomotive bed, recently made by the Commonwealth Steel Co., Granite City, Ill., for the Southern Pacific, was 52 feet long and was cast in one piece. This casting, the longest ever made by the Commonwealth, weighed approximately 30,000 pounds. The same company also cast three locomotive beds for diesel electric engines being built for the Pennsylvania railroad.

Foundry Association Directory

The Buffalo Foundrymen
Buffalo

President, J. McARTHUR, Washington Iron Works; secretary, W. J. WARK, E. J. Woodison Co., 146 Chandler street. Meetings the third Wednesday of the month at 146 Chandler street.

Chicago Foundrymen's Club
Chicago

President, CHARLES L. LARSEN, Armour Institute of Technology, 3200 Federal street, Chicago. Meetings second Saturday in each month at the City club, 315 Plymouth court.

Connecticut Foundrymen's Association

President, FRED W. STICKLE, Capitol Foundry Co., Hartford, Conn.; secretary, C. S. NEUMANN, Union Mfg. Co., New Britain, Conn. Meetings are on second Friday of each month in various parts of the state.

Detroit Foundrymen's Association
Detroit

President, ROBERT G. CRAWFORD, Atlas Foundry Co., 131 South Artillery street, Detroit; secretary, RUSSELL M. SCOTT, Packard Motor Co., 1580 East Grand boulevard, Detroit. Meetings third Thursday in each month at the Union League club, 35 Grand River avenue, Detroit.

Metropolitan Brass Foundry Association
New York

President, THOMAS HARPER, Thomas Harper, 204 Lafayette street, New York; secretary, WM. E. PAULSON, Thomas Paulson & Son Inc., 97 Second avenue, Brooklyn, N. Y. Meetings second Wednesday in each month at the Building Trades club, 34 West Thirty-third street, New York.

Newark Foundrymen's Association
Newark, N. J.

President, J. L. CARTER, Barlow Foundry, Inc., Newark; secretary, W. H. MANTZ, Atlas Foundry Co., Irvington, N. J. Meetings called by president.

New England Foundrymen's Association

President, H. P. BLUMENAUER, Arcade Malleable Iron Co., Worcester, Mass.; Secretary, FRED F. STOCKWELL, 205 Broadway, Cambridgeport, Mass. Meetings second Wednesday of each month at the Exchange club, Boston. Outings usually are held in the summer months.

Ohio State Foundrymen's Association

President, WALTER L. SEELBACH, Walworth Run Foundry Co., 2488 West Twenty-seventh street, Cleveland; secretary-manager, ARTHUR J. TUSCANY, 5713 Euclid avenue, Cleveland.

Philadelphia Foundrymen's Association
Philadelphia

President, WALTER WOOD, R. D. Wood & Co., Philadelphia; secretary HOWARD EVANS, J. W. Paxson Co., Luzerne and D streets, Philadelphia. Meetings the second Wednesday of each month at the Manufacturers' club.

Pittsburgh Foundrymen's Association
Pittsburgh

President, LAWRENCE V. STEVENS, Locomotive Stoker Co., N. E. Pittsburgh; secretary-treasurer, WM. J. BRANT, Wm. J. Brant, Bessemer building, Pittsburgh. Meeting on the third Monday of the month, except in July and August, at Fort Pitt hotel.

Quad-City Foundrymen's Association
Davenport, Iowa

President J. H. DIEDRICH, Blackhawk Foundry & Machine Co., Davenport, Iowa; secretary-treasurer, A. D. ZIEBARTH, Davenport Foundry & Machine Co., Davenport, Iowa. Meetings the third Monday evening of each month, the meeting place being rotated between Moline, Rock Island and Davenport.

Southern Metal Trades Association
Atlanta, Ga.

President, GEORGE B. COCKER, Gastonia, N. C.; secretary-treasurer, W. E. DUNN JR., Healey building, Atlanta, Ga.

Tri-City Technical Council
Moline, Ill.

Chairman, H. BORNSTEIN, Deere & Co., Moline, Ill.; treasurer, MAX SKLOVSKY, Deere & Co., Moline, Ill. Combined meetings held only one or two times a year on call.

Tri-State Foundrymen's Association
Cincinnati

President, HAROLD P. RITTER, John A. Oberhelman Foundry Co., 3323 Colerain avenue; secretary, GEORGE W. PIEHL, Wessling Bros. Foundry Co., 1607 McLean avenue. Meetings the second Thursday of each month at the Cincinnati club, Eighth and Race streets.

Twin City Foundrymen's Association
Minneapolis-St. Paul

President, J. A. TEACH, Minneapolis Steel & Machinery Co., Minneapolis; secretary-treasurer, C. E. LANGDON, 3849 Lyndale avenue, So., Minneapolis. Meetings monthly at the Athletic club.

Suggests Molding Method for Gear Blanks

Question: We will appreciate your advice on the best method for molding a gear blank approximately 3 feet diameter, 6-inch face with six elliptical arms. We have had considerable trouble with a somewhat smaller wheel in which dirt and shrink holes appear after the teeth are cut.

Answer: The dirt and shrink holes may be due to your molding practice or to your melting practice or to both so that really it is rather difficult to suggest the exact cause of your trouble. The casting would be classified as a plain, simple job requiring no particular skill to mold, therefore, it is apparent that your trouble is due to something outside the usual routine. The best method for molding the wheel depends on local conditions, available pattern equipment and the number of castings to be made and exerts practically no bearing on the condition of the casting. The pattern may be bedded in the floor, rolled over in a drag or made upon a machine in which one part of the pattern serves for the drag and a second part for the cope. Satisfactory castings may be secured by either method provided ordinary precautions are observed. Basing our opinion on general experience we are inclined to the opinion that your trouble is due to a dirty runner, with perhaps cold iron and an ill vented mold as contributory factors. The average green sand basin through which iron is poured into a mold, rarely is satisfactory, especially on a casting which has to be machined to such an extent as a cut gear blank. Erosion from the stream of iron washes a certain amount of sand into the mold and this usually is carried into the rim. To overcome this tendency it is advisable either to use a dry sand runner basin, or to make up the green sand basin with a suitable block for a pattern. Even with the best of such care danger always exists. The falling stream may strike the edge of the basin and wash sand with it.

As a secondary means of preventing dirt from entering the mold it is advisable to pour the iron through several small runners, rather than through one large runner. The many small runners admit the iron in sufficient volume and yet act as a strainer in retaining any dirt floating on the surface. For one or two molds twelve ½-inch diameter runner sticks may be rammed into a ring 1½ inches apart on the hub. If many castings are required, a ring core with the same size and number of holes may be rammed directly on top of each hub. In either case a suitable basin is built on top extending from the center to a point near the side where the iron from the ladle may enter it gently.

Unless the sand is unusually *open* the iron will kick in a mold of this kind unless it is well vented with a wire. This boiling action of the iron creates slag and dirt. The steam forms bubbles. Some of the bubbles work through, but others are trapped in the solidifying iron and develop afterward as cavities or porous areas in the iron. They also in some instances are responsible for shrink holes since they occupy the space which should be occupied by iron available for feeding.

Faked Foundry Facts

Shot

Issues Permanent Folder

To facilitate the filing of its bulletins and to make them convenient for reference, the Lebanon Steel Foundry, Lebanon, Pa., has issued a permanent folder containing several attractive sales bulletins. The Lebanon company manufacturers electric steel castings and the bulletins issued deal with the castings and the method of manufacture, including bulletins on molding sand, core sand, technical control, patterns, etc., showing their application to the production of steel castings at the plant of the company.

Cast Steel Ingot Molds Are Not Suitable

Question: We are contemplating the use of cast steel ingot molds for ingots ranging in weight from 3 to 30 tons and will appreciate your opinion on the subject. How many heats might we expect from a steel mold? Is any special treatment required? Should the molds be annealed and at what temperature? Should the mold be coated with any special material? What is the proper analysis and the correct metal thickness of one of these molds?

Answer: Up to the present THE FOUNDRY has not learned of any place where steel ingot molds are employed. Your inquiry was submitted to the heads of several prominent plants in this country and it is found that the original opinion is confirmed. The following quotations are from (*a*) the president of a large foundry company making heavy castings in both gray iron and steel; (*b*) a prominent steel foundryman, now sales manager for a steel foundry specializing in heavy castings; (*c*) the metallurgical engineer of a corporation which operates many steel plants.

(*a*) Personally we have had no experience in making cast steel ingot molds. The company whose plant we acquired had some very disastrous losses in attempting to make them in competition with iron molds. Also I have an impression that a prominent southern steel company spent a great many thousand dollars attempting to make steel molds for its own use. This was on account of the difficulty of securing suitable iron for molds in that territory. Of course there may be special conditions in which steel molds are necessary. Based on American experience I would say the proposition is not practical.

(*b*) In more than 30 years of experience in the steel casting business we never have found the use of cast steel ingot molds practicable. We do not believe that a cast steel mold would stand up for any length of time. After a few heats it would be warped so badly that it would be impossible to remove the ingot. Cast steel molds have been tried a great many times without any success whatsoever.

(*c*) We use iron ingot molds exclusively in our steel plants and therefore cannot furnish any data on steel molds.

George E. Coursey and E. E. Elsey have been appointed special representatives in southern Ohio, southeastern Indiana and eastern Kentucky by the Chain Belt Co., Milwaukee. They will be located at 701 Union Central building, Cincinnati.

Foundry Equipment Buying Lags

Manufacturers Report Considerable Interest at Detroit Show and Anticipate Heavier Equipment Sales in the Near Future

WHILE sales of foundry equipment were not heavy the first half of the month, manufacturers feel that much of the interest developed at the Detroit exhibition will produce orders during the next few weeks. Equipment buying in New England is gaining ground despite the recent absence of purchasing agents who were at Detroit. The Eastern Malleable Iron Co., Naugatuck, Conn., is in the market for a long list of equipment for an $80,000 foundry addition now under construction.

Foundry equipment sales have fallen off considerably in the Pittsburgh area since the first of October. However, before the month is out they promise to pick up considerably since a large number of inquiries now are pending, including many developed at the Detroit exhibition. A number of inquiries pending for several months still are held in abeyance, including those of the Bethlehem Steel Corp. for cupolas, and the S. Morgan Smith Co., York, Pa., for various kinds of equipment. The Ohio Brass Foundry, Mansfield, O., and the Crown Pipe & Foundry Co., Jackson, O., are understood to be contemplating early purchases of some equipment.

The Chicago foundry equipment market has shown less activity in September than prevailed during August. The last half of the month was especially slow, due to interest displayed by both buyers and exhibitors in the foundrymen's exposition at Detroit. However, the show is expected to bring out a good volume of business during the present month and a number of inquiries have resulted from sales work at the motor city. Makers of sand preparing and handling equipment are optimistic over prospects at hand.

CHICAGO MARKET

Cranes

Hammond Foundry Co., Hammond, Ind., 5-ton low-head, handpower hoist, from H. D. Conkey & Co., Mendota, Ill., through Page & Ludwick, Chicago.

Dust Arrester Equipment

Wagner Malleable Iron Co., Decatur, Ill., from the Pangborn Corp., Hagerstown, Md.

Sandblast Equipment

Warman Steel Casting Co., Los Angeles, Calif.; Remy Electric Co., Anderson, Ind.; from the Pangborn Corp., Hagerstown, Md.

Sand Preparing Equipment

York Foundry & Engine Works, York, Nebr., one sand separator and blender from the Royer Foundry & Machine Co., Wilkes-Barre, Pa., through Alexander Haigh, Boston.

Benton Harbor Malleable Iron Industries, Benton Harbor, Mich., sand blender and separator, from Royer Foundry & Machine Co., Wilkes-Barre, Pa., through Page & Ludwick, Chicago.

Shakeout Equipment

Holland Furnace Co., Holland, Mich., vibrator and shakeout equipment; from the Stoney Foundry Engineering & Equipment Co., Cleveland.

Miscellaneous

Dole Valve Co., Chicago, two magnetic separators for brass foundry, from Magnetic Mfg. Co., Milwaukee, through Page & Ludwick, Chicago.

NEW YORK MARKET

Neemes Foundry Co., Troy, N. Y.; from the Pangborn Corp., Hagerstown, Md.

Shakeout Equipment

Burnham Boiler Co., Elizabeth, N. J., shakeout bails; New York Air Brake Co., Watertown, N. Y., vibrator and shakeout equipment; from the Stoney Foundry Engineering & Equipment Co., Cleveland.

PITTSBURGH MARKET

Sandblast Equipment

Pittsburgh Plate Glass Co., Charleroi, Pa.; from the Pangborn Corp., Hagerstown, Md.

Sand Preparing Equipment

S. Morgan Smith Co., York, Pa., batch mixer with elevating equipment, from the Standard Sand & Machine Co., Cleveland.

Shakeout Equipment

Pittsburgh Plate Glass Co., Forrest City, Pa., shakeout bails; Ajax Iron Works, Corry, Pa.; Westinghouse Air Brake Co., Wilmerding, Pa., vibrator and shakeout equipment from the Stoney Foundry Engineering & Equipment Co., Cleveland.

CLEVELAND MARKET

Dust Arrester Equipment

Chrysler Corp., Detroit; Packard Motor Car Co., Detroit; Wm. H. Barr, Inc., Buffalo; from the Pangborn Corp., Hagerstown, Md.

Sandblast Equipment

Cadillac Motor Car Co., Detroit; Lake Erie Foundry Co., Buffalo; from the Pangborn Corp., Hagerstown, Md.

Sand Preparing Equipment

Buckeye Foundry Co., Cincinnati, one sand separator and blender from the Royer Foundry & Machine Co., Wilkes-Barre, Pa., through Alexander Haigh, Boston.

Shakeout Equipment

Ohio Steel Foundry Co., Lima, O., shakeout bails; Sterns Conveyor Co., Cleveland, shakeout bails to be included with conveyor order; from the Stoney Foundry Engineering & Equipment Co., Cleveland.

NEW ENGLAND MARKET

Molding Machines

Barbour-Stockwell Co., Cambridge, Mass., two jar squeezers and rollover machines; George H. Lincoln Co., South Boston, two rollover machines; Nashua Brass Co., Nashua, N. H., two plain power squeezers; American Hardware Co., New Britain, Conn., two plain power squeezers; Coppus Engineering Co., Worcester, Mass., two split pattern machines; from the Tabor Mfg. Co., Philadelphia.

Howe Scale Co., Rutland, Vt., three rollover molding machines; from the Herman Pneumatic Machine Co., Zelienople, Pa.

Sandblast Equipment

Gallison Brass Foundry, Inc., Lawrence, Mass., from the Pangborn Corp., Hagerstown, Md.

Sand Preparing Equipment

Worthington Pump & Machinery Co., Boston, sand separator and blender from the Royer Foundry & Machine Co., Wilkes-Barre, Pa., through Alexander Haigh, Boston.

New Trade Publications

JIB CRANES AND HOISTS—Herbert Morris Inc., Buffalo, has issued two folders describing its jib cranes and hoist blocks.

AIR COMPRESSORS—Westinghouse Traction Brake Co., Wilmerding, Pa., has issued a folder giving the features of its compressor for foundry installations.

CORE OILS—Several pamphlets describing its core oil and giving the specifications have been issued by the Detroit Core Oil Co., Detroit.

CHEMICAL WARE—A folder describing some of its chemical and laboratory apparatus and glassware has been issued by the Palo Co., New York.

BUILDINGS—The Standard Erecting Co., New York, has issued a catalog showing the features of its standardized buildings which are adaptable for foundry requirements.

REFRACTORY CEMENT—General Refractories Co., Philadelphia, has issued a leaflet describing a high temperature cement it is producing for use in furnaces and similar places where high temperature is met.

FIRE BRICK CEMENT—A. P. Green Fire Brick Co., Mexico, Mo., has issued a leaflet covering its all-temperature fire brick cement with high alumina base. Its use is described for bonding, surfacing, reclaiming, filling and repairing.

SKIP LIFT—Application of the skip hoist principle to the elevation of bulk materials in industrial use is covered in a bulletin by the R. H. Beaumont Co., Philadelphia. The lift may be automatic, semiautomatic or manually operated.

ARC WELDERS—A bulletin by the General Electric Co., Schenectady, N. Y., covers the company's automatic machine for welding small tanks. It is fully illustrated with halftones of the welders and diagrams, and full engineering data are given.

FLOORING—Irving Iron Works Co., Long Island City, N. Y., is mailing cards calling

attention to a new type of open-mesh flooring for use over open spaces. A series of curved members gives a different appearance and certain advantages in use are claimed.

ENGINE INDICATOR—Bachrach Industrial Instrument Co., Pittsburgh, has issued a bulletin describing a type of engine indicator it is manufacturing. Value of indicator readings is discussed and the bulletin is illustrated fully to show the construction and operation of the indicator.

ELECTRIC HEAT—Use of electricity for production of industrial heat is presented in a bulletin by the General Electric Co., Schenectady, N. Y. It is a series of advertisements used by this company in trade publications to carry the message of heat for various purposes.

COMBUSTION CONTROL—A system of automatic combustion and temperature control is described in a bulletin by F. J. Ryan & Co., Philadelphia. The equipment for this purpose is not designed as an auxiliary but by a system of specially designed valve groups which control the burners according to a predetermined setting of the control apparatus. Illustrations show the construction and operation of the device and actual installations are pictured.

TURBINE VENTILATORS—Allen Air Turbine Ventilator Co., Detroit, is sending out a booklet covering its multivane ventilators for various industrial uses. It is illustrated with detail drawings of construction and by actual installations. Tables of specifications also are given.

What the Foundries Are Doing

Activities of the Gray Iron, Malleable, Steel and Brass Shops

Hunt-Spiller Corp., 383 Dorchester avenue, Boston, will build a 1-story foundry addition.

Pratt & Letchworth Co., 189 Tonawanda street, Buffalo, malleable castings, will build a 1-story addition.

Holden Foundry Co. Ltd., 232 Southern street, Vancouver, B. C., has been incorporated with $50,000 capital.

H. Wallwork Foundry Co., Tenth avenue, and Forty-first street, Birmingham, Ala., will rebuild its burned gray iron foundry.

Peninsular Stove Co., Fred Moran president, Trumbull and Fort streets, Detroit, is planning a new plant for erection early in 1927.

Chamber of commerce, Geneva, N. Y., has plans for a brass foundry and office, one story, 50 x 150 feet.

Kay Steel Wheel Co., Alhambra, Calif., is building a foundry 85 x 200 feet, with other units to follow.

Detroit Gray Iron Foundry Co., Detroit, will build an addition to its plant from plans being prepared by Mildner & Eisen, Detroit.

Sloan Valve Co., Chicago, W. E. Sloan president, 4300 West Lake street, is having plans made for a 3-story plant 100x135 feet.

Electric Steel Products Co., Turner Falls, Mass., will rebuild burned portion of its foundry building recently damaged.

Forest City Foundry Co., Cleveland, has given contract to H. G. Slatmyer Co., 203 Lakeside avenue, for a 1-story addition 60x152 feet.

Elmira Foundry Co., Elmira, N. Y., James D. McCann president, has let contracts to Lowman Construction Co., 312 Railroad avenue, for alterations and an addition to its plant.

San Angelo Foundry & Machine Co., San Angelo, Tex., has been incorporated with $40,000 capital by Johanna Willig, Robert Willig and A. A. Koch.

McWayne Cast Iron Pipe Co., 3600 Eleventh avenue, Birmingham, Ala., will build a 2-story plant addition. Warren, Knight, Davis, Empire building, are architects.

Art & Bronze Co., 1732 East Thirty-seventh street, Cleveland, is having plans drawn for a 2-story foundry building 34 x 70 x 125 feet on East Forty-third street near Chester avenue.

Francis V. Nygren Foundry Co., 2542 Fillmore street, Chicago, has renewed lease to its plant at that number until 1965, and will make some additions.

Columbiana Foundry Co., Walnut street, McKeesport, Pa., manufacturer of radiators, F. Tho. Nason president, J. T. McLane vice president, will build additions to its plant to increase production.

American Gas Machine Co., Albert Lea, Minn., will build first unit of its plant at once, 100 x 280 feet, at Front and Madison streets. John F. Hanson has been given contract. Further units will be added later.

Alabama Foundry Co., North Birmingham, Ala., is building a 1-story foundry for iron and steel castings adjoining the plant of the Davis Pipe & Fittings Co., which has been acquired and is being refitted for use.

Herman Beiring and Arthur Richmond, Tacoma, Wash., have leased a site of half an acre from Gus Hensler, Anacortes, Wash., and have given contract to L. A. Farmer for erection of a foundry plant.

Permanent Grate Mfg. Co., New York, has been incorporated with $20,000 capital to manufacture boiler grates by S. Dressel, E. Gelduld and L. Glaser. M. Freed, 46 West Forty-sixth street, is attorney.

White Four Wheel Brake Co., Buffalo, has been incorporated with $100,000 capital to operate a foundry by A. B. Puma, H. J. White and C. A. Ribendetto. C. Nichols, East Aurora, N. Y., is attorney.

Sears Roebuck & Co., Arthington and Homan avenues, Kankakee, Ill., has let contract to T. P. Collins & Son, 315 South Elmwood street, Kankakee, Ill., for a 1-story addition to its stove plant 24 x 60 feet.

Robert Silverstein, 115 South Globe street, Peoria, Ill., has let contract to Central Construction Co., 115 Fayette court, for a 1-story foundry plant 80 x 150 feet at 2600 North Adams street.

A merger has been consumated between the United Brass Mfg. Co., Cleveland, and the Oberndorf Mfg. Co., Pittsburgh. The new concern will be known as the United-Oberndorf Corp., with general offices in Cleveland.

Standard Foundry Co., Racine, Wis., Arthur R. Janes president, has let contract to Nelson & Co. for a 1-story addition 110x220 feet for foundry use, present foundry to be converted into cleaning room.

Joubert & Goslin Machine & Foundry Co., Birmingham, Ala., manufacturer of sugar refining equipment, has had plans made for and extension to enlarge its production of evaporating and drying equipment for chemical plants.

Duncan Foundry & Machine Works, Inc., 102 West Seventh street, Alton, Ill., has been incorporated with $30,000 capital to conduct a foundry and machine shop by William M. Duncan, George D. Duncan and John Duncan. E. J. Verlie, Alton, is correspondent.

Benton Harbor Malleable Industries, Benton Harbor, Mich., has been incorporated with 60,000 shares no par value to manufacture metal products by J. Nellis Klock, 715 Pipestone street, Willard J. Banyon and Humphrey S. Gray.

Whitite Steels & Steel Castings Co. Inc., Lincoln, N. J., has been incorporated with $100,000 capital by Edward J. Spink, New York; Ferdinand Baumann, Bernardsville, N. J.; John T. Whiteley, Brooklyn, N. Y. William T. Carey, New York, is attorney.

McNally-Tollefson Foundry Co., Stoughton, Wis., has been incorporated with $50,000 capital and 1000 shares no par value to operate a foundry and machine shop by Nelle W. Tollefson, E. M. Tollefson and John E. McNally.

Southern Malleable Iron Co., B. B. Culver president, 5661 Natural Bridge avenue, St. Louis, has let contract to St. Louis Structural Steel Co., Syndicate Trust building, St. Louis, for rebuilding its burned plant, one story 244 x 448 feet, at Twenty-first and Bina avenues, East St. Louis, Ill.

St. Bernard Mfg. Co., St. Bernard, O., has let contract to H. K. Ferguson Co., 4900 Euclid avenue, Cleveland, for a complete plant, including foundry 105 x 233 feet, with mezzanine 20 x 45 feet and a 2-story cupola section 40 x 52 feet, 1-story storage building 46 x 192 feet and a 2-story office building 16 x 34 feet.

Owing to an error in the Sept. 15 issue, the Kingston Brass Foundry was reported as being in Union City, N. J. The item corrected, is, Kingston Brass Foundry, Inc., Bayonne, N. J., has been incorporated with $100,000 capital by Charles C. Kingston, M. C. See and Theodore D. See, Jersey City, N. J. C. E. Stewart, Jersey City, is attorney.

Deemer Alloys Corp., founders of brass, bronze, aluminum and copper castings has been established in Wilmington, Del. Frank J. Deemer, formerly works manager, Deemer Steel Co., Wilmington, is president and general manager. W. S. Ferguson, formerly with the American Manganese Steel Co., is secretary and treasurer, and in charge of sales.

John K. Tener and associates of Charleroi, Pa., have applied for a charter for the Charleroi Steel Foundries Co., Charleroi, Pa. The plant will be located in McKean avenue near North Charleroi. Several hundred workmen will be employed when the plant attains capacity production. Stockholders and officers of the new concern are Charleroi business and professional men.

Change in the organization of the Price-Evans Foundry Co., Chattanooga, Tenn., was indicated in papers just filed to incorporate under the name of the Price-Evans Foundry Corp. The papers provide for the issuance of 800 shares of common and preferred shares in the same amount having a value of $100 a share and 800 shares of no par stock. The incorporators listed do not include all those formerly interested in the company. H. F. Griscom, previously interested in the company, heads the list of the new incorporators.